Troubleshooting Cisco Wide Area Application Services

Session ID-3006

Agenda

- WAE Overview
- Diagnostic Reports
- Physical Components
- Platform
- Transport Optimizations
- Application Acceleration
- Packet Capture Debugs
- Summary

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WAE Overview

> WAE Overview
Diagnostic Reports
Physical Components
Platform
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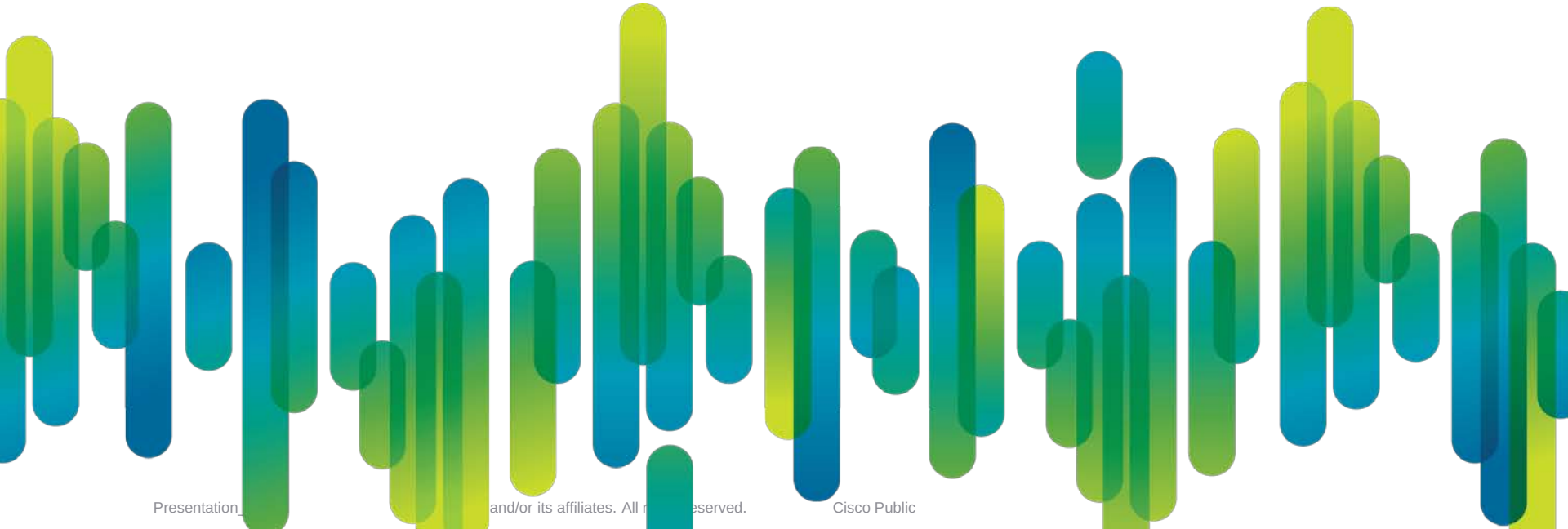
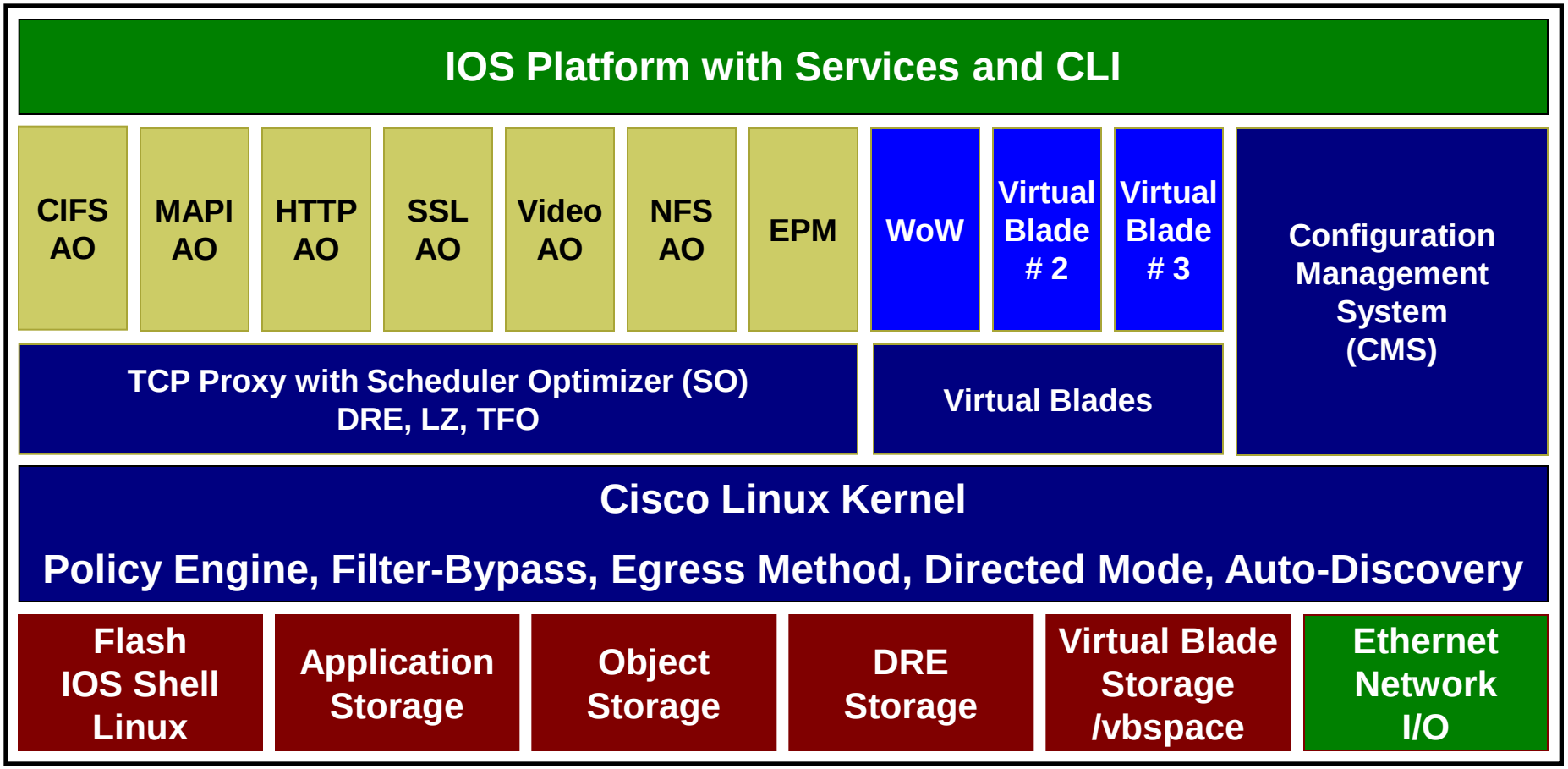
Application Acceleration
Packet Capture Debugs
Summary



Wide Area Application Engine (WAE)

Wide Area Application Services Version 4.1



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Diagnostic Reports

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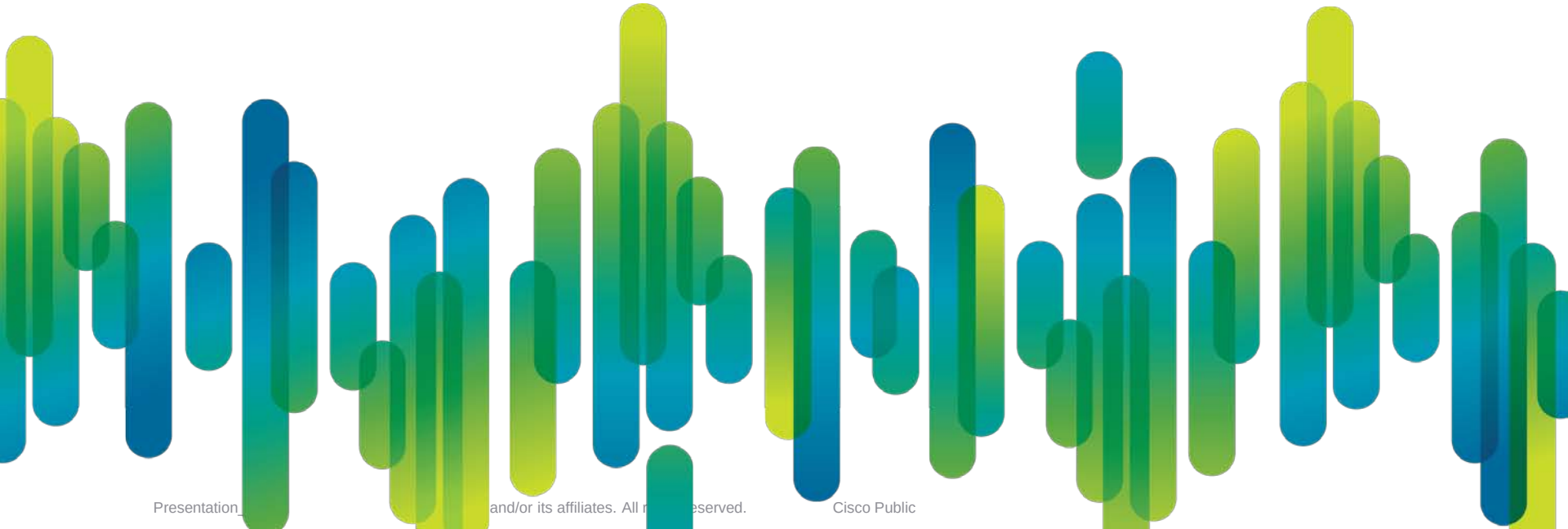
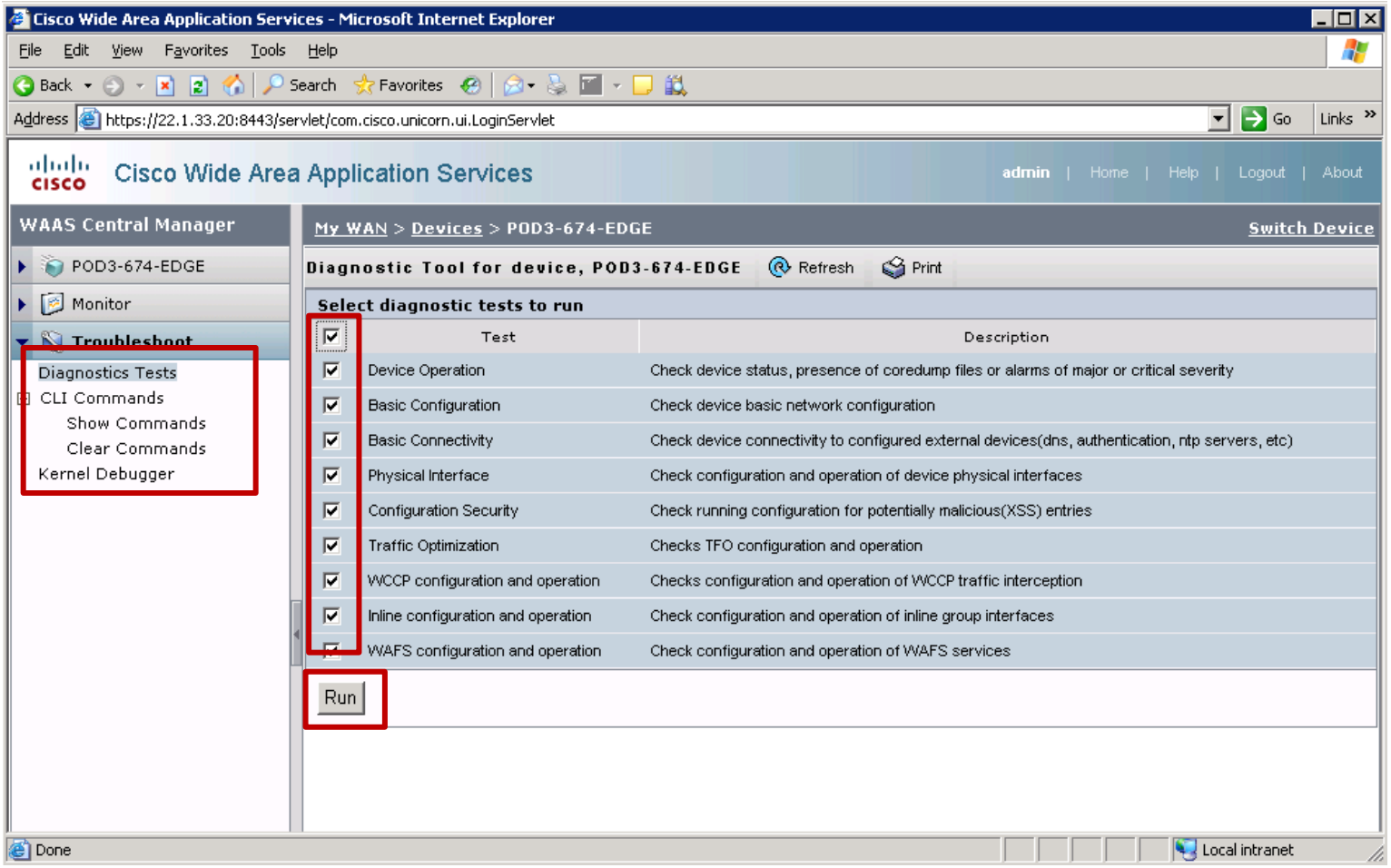


Self Diagnostic Tool

A Good Place to Start…



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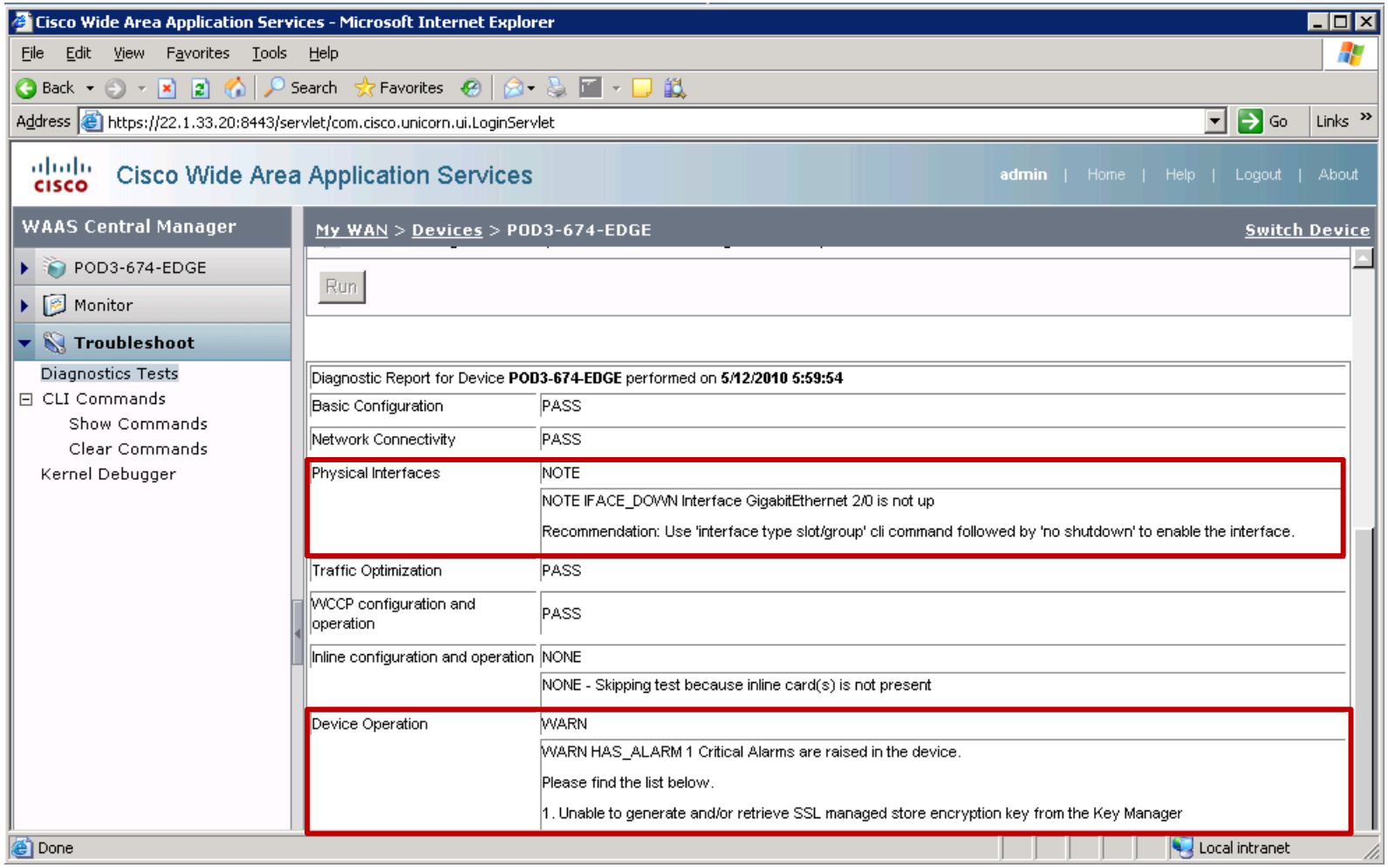
Self Diagnostic Tool


Cisco Wide Area Application Services - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address https://22.1.33.20:8443/servlet/com.cisco.unicorn.ui.LoginServlet
Go Links
Cisco Wide Area Application Services
admin | Home | Help | Logout | About
WAAS Central Manager
POD3-674-EDGE
Monitor
Troubleshoot
Diagnostics Tests
CLI Commands
Show Commands
Clear Commands
Kernel Debugger
My WAN > Devices > POD3-674-EDGE
Switch Device
Run
Diagnostic Report for Device POD3-674-EDGE performed on 5/12/2010 5:59:54
Basic Configuration PASS
Network Connectivity PASS
Physical Interfaces NOTE
NOTE IFACE_DOWN Interface GigabitEthernet 2/0 is not up
Recommendation: Use 'interface type slot/group' cli command followed by 'no shutdown' to enable the interface.
Traffic Optimization PASS
WCCP configuration and operation PASS
Inline configuration and operation NONE
NONE - Skipping test because inline card(s) is not present
Device Operation WARN
WARN HAS_ALARM 1 Critical Alarms are raised in the device.
Please find the list below.
1. Unable to generate and/or retrieve SSL managed store encryption key from the Key Manager
Done
Local intranet

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Self Diagnostic CLI - Report Files

```
POD3-674-EDGE#test self-diagnostic all
running test `basic'
running test `connectivity'
running test `interfaces'
running test `tfo'
running test `wccp'
running test `inline'
running test `system'
running test `wafs'
running test `application-security'

------------------------------------------------------------
Diagnostic Report performed on 5/12/2010 6:7:8

<snip>
Test WARN  [system]
     WARN  HAS_ALARM        1 Critical Alarms are raised in the device.
 Please find the list below.
 1.     Unable to generate and/or retrieve SSL managed store encryption key fro
     Action:
     Critical/major alarms are raised. Check device alarms using 'show alarms d
Test NONE  [wafs]
     NONE  -                Skipping test because Wafs is not enabled
Test PASS  [application-security]
```

Local copy of last diagnostic report

```
POD3-674-EDGE#dir diag*
      size          time of last change            name
--------------  -------------------------        -----------
           970  Wed May 12 06:07:08 2010          /local1/diagnostic_report.txt
          1225  Wed May 12 06:07:08 2010          /local1/diagnostic_report.xml
POD3-674-EDGE#
```


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WAAS System Report

- WAAS system report (sysreport)
  - Compressed archive
  - Relevant support and system health information

- The sysreport includes the following:
  - Command output
  - Logs
  - etc.
  - Configurations
  - State Information

- The sysreport can be generated from the WAE Manager GUI or CLI:

```
dcn-wave274-1#copy sysreport <disk | ftp | tftp> ...
```


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Physical Components

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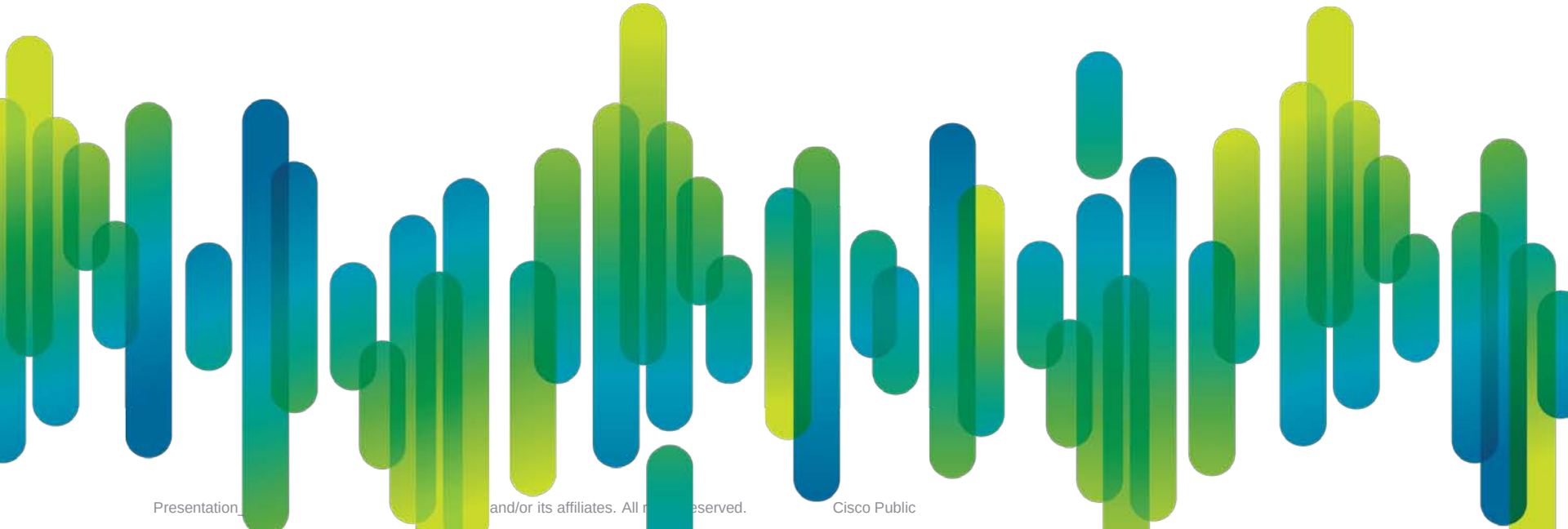

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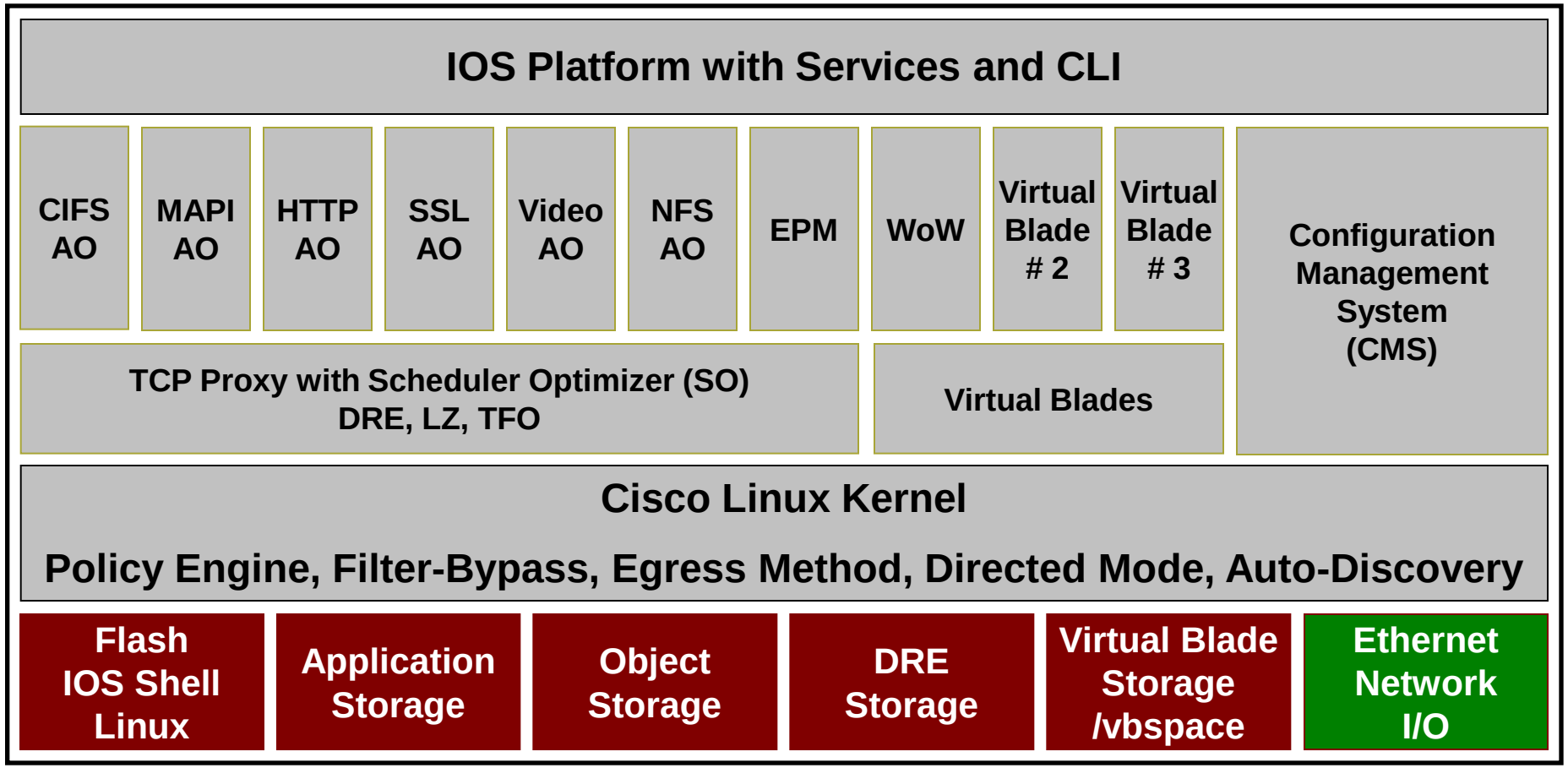

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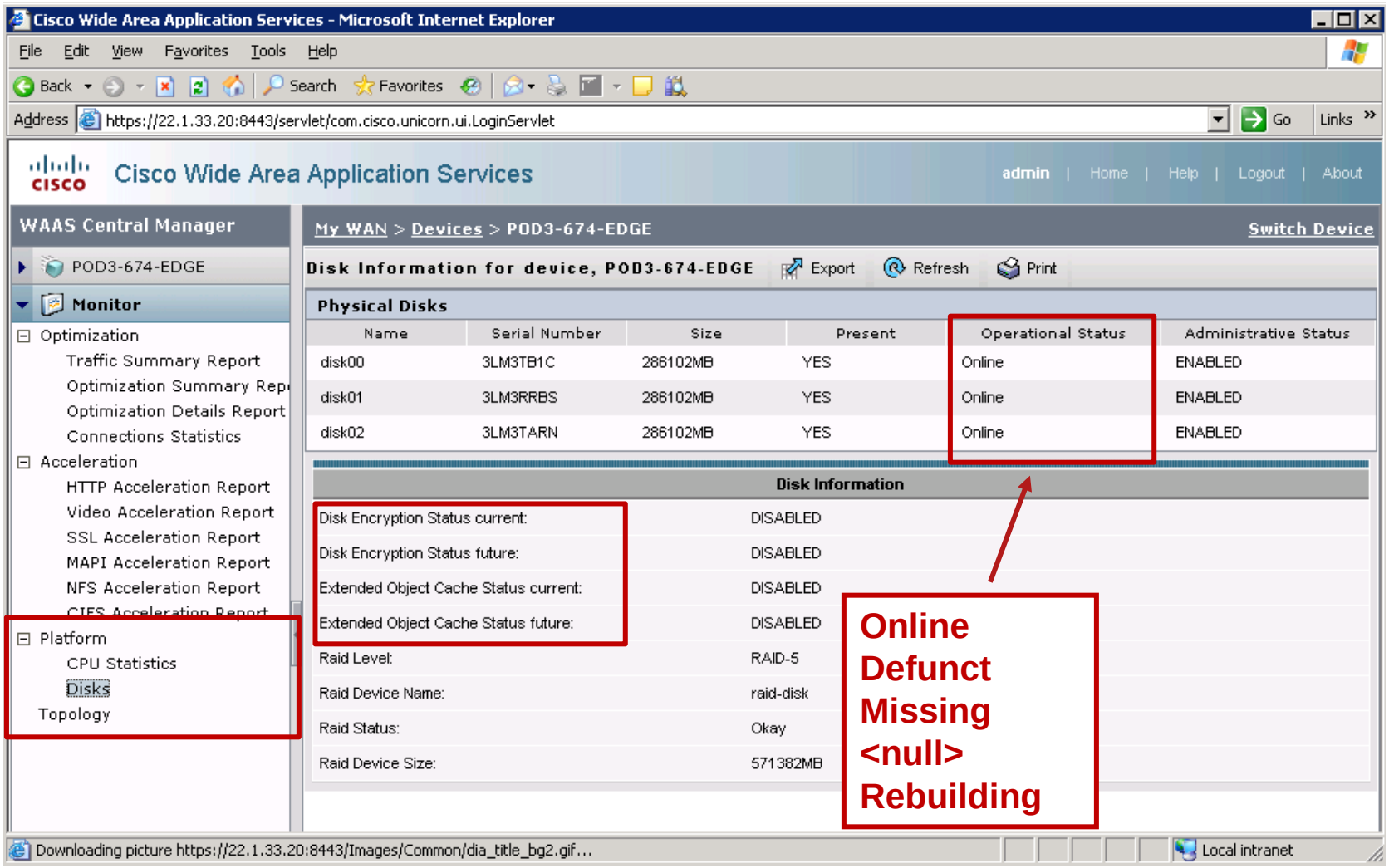
Disk Health and Status



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Failed Disk Replacement

- Disk failures are automatically detected by the system
  - Failed disks are automatically removed from service
  - Not present or not responding (Shutdown)
- Administrator can also shutdown disk for scheduled replacement:

```
WAE7326(config)# disk disk-name disk01 shutdown
Device maybe busy while going offline ... please wait!
mdadm: set /dev/sdb1 faulty in /dev/md0
mdadm: set /dev/sdb2 faulty in /dev/md1
< snip >
WAE7326(config)#
```

RAID-1

```
WAE674# disk disk-name disk01 replace
Controllers found: 1


Command completed successfully.
WAE674#
```

RAID-5

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Disk Partitions

```
POD3-674-EDGE#show disk detail

RAID Physical disk information:
  disk00: Online                        3LM3TB1C    286102 MB
  disk01: Online                        3LM3RRBS    286102 MB
  disk02: Online                        3LM3TARN    286102 MB

RAID Logical drive information:
  raid-disk:    RAID-5  Okay
                Enabled   (read-cache) Enabled (write-back)

Mounted file systems:
 MOUNT POINT      TYPE       DEVICE              SIZE     INUSE      FREE USE%
 /swstore         internal   /dev/sda2           991MB     550MB     441MB  55%
 /state           internal   /dev/sda3          7935MB     196MB    7739MB   2%
 /local/local1    SYSFS      /dev/sda6         22318MB     339MB   21979MB   1%
 /vbspace         GUEST      /dev/data1/vbsp  254926MB     128MB  254798MB   0%
 /sw              internal   /dev/sda1           991MB     790MB     201MB  79%
 .../local1/spool PRINTSPOOL /dev/data1/spool    991MB      32MB     959MB   3%
 /obj1            CONTENT    /dev/data1/obj   121015MB     155MB  120860MB   0%
 /dre1            CONTENT    /dev/data1/dre   119031MB     418MB  118613MB   0%
 /ackq1           internal   /dev/data1/ackq    1189MB       0MB    1189MB   0%
 /plz1            internal   /dev/data1/plz     2379MB       1MB    2378MB   0%

Disk encryption feature is disabled.

Disk object cache extend is disabled.
POD3-674-EDGE#
```


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Important Directories and Log Files

- The following directories are used by Cisco WAAS for log files
  - **/local1** – Root directory for all log files
  - **/local1/logs** – Service log files (aka “admin” logs)
  - **/local1/errorlog** – Service log files (aka “debug” logs)
  - **/local1/core_dir** – Process core dump files
- File system navigation commands

cd	pwd
dir	type
find-pattern	type-tail <filename> <lines> [|	follow]

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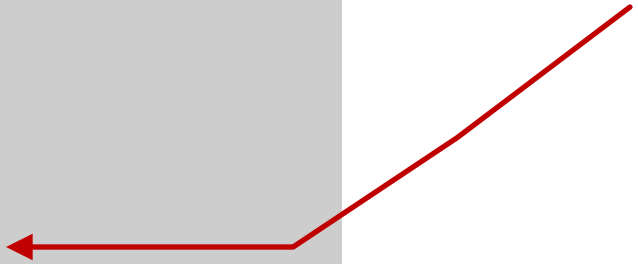
Ethernet Interface Errors

```
WAE7341# show int gi 1/0
Type:Ethernet
Ethernet address:00:14:5E:AC:2D:79
Internet address:10.88.80.135
Broadcast address:10.88.80.255
Netmask:255.255.255.128
Maximum Transfer Unit Size:1500
Metric:1
Packets Received: 160661
Input Errors: 0
Input Packets Dropped: 0
Input Packets Overruns: 0
Input Packets Frames: 0
Packet Sent: 122371
Output Errors: 0
Output Packets Dropped: 0
Output Packets Overruns: 0
Output Packets Carrier: 0
Output Queue Length:1000
Collisions: 0
Interrupts:16
Flags:UP BROADCAST RUNNING MULTICAST
Link State: Interface is up,line protocol up
Mode: autoselect, full-duplex, 1000baseTX
WAE7341#
```

Verify Interface Statistics for Errors



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Ethernet Interface Speed / Duplex

```
WAE7341# show int gi 1/0
Type:Ethernet
Ethernet address:00:14:5E:AC:2D:79
Internet address:10.88.80.135
Broadcast address:10.88.80.255
Netmask:255.255.255.128
Maximum Transfer Unit Size:1500
Metric:1
Packets Received: 160661
Input Errors: 0
Input Packets Dropped: 0
Input Packets Overruns: 0
Input Packets Frames: 0
Packet Sent: 122371
Output Errors: 0
Output Packets Dropped: 0
Output Packets Overruns: 0
Output Packets Carrier: 0
Output Queue Length:1000
Collisions: 0
Interrupts:16
Flags:UP BROADCAST RUNNING MULTICAST
Link State: Interface is up,line protocol up
Mode: autoselect, full-duplex, 1000baseTX
WAE7341#
```

Verify Interface State, Speed and Duplex

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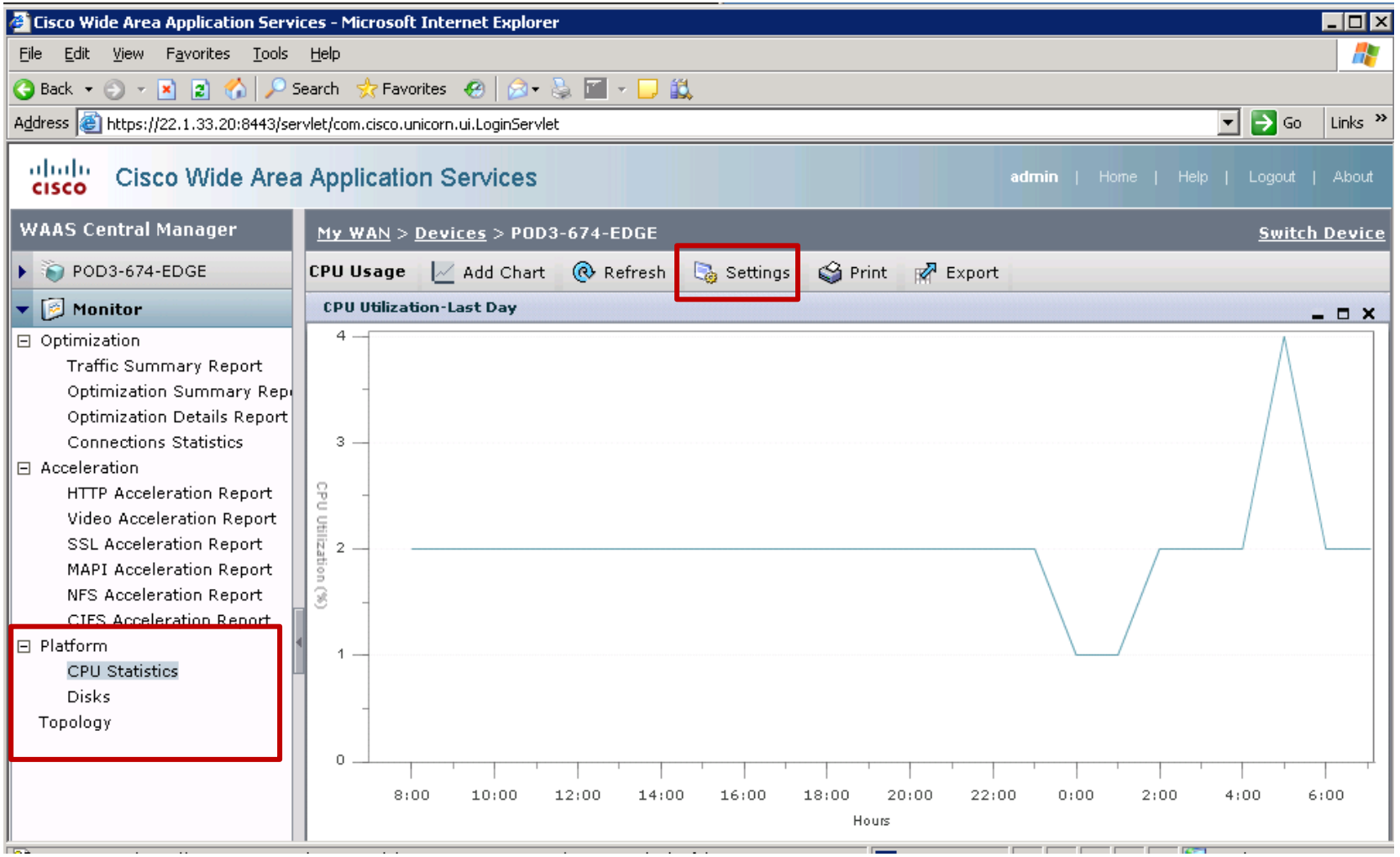
CPU Utilization (Historical)



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CPU Utilization (Real Time)

```
POD3-674-EDGE#show processes cpu

CPU utilization:
CPU name      User      Nice   System     Idle   IOwait     IRQ  softIRQ    Steal
    cpu:     0.06%     1.51%     0.46%    97.90%     0.05%    0.00%     0.01%     0.00%
   cpu0:     0.05%     1.51%     0.42%    97.95%     0.05%    0.00%     0.03%     0.00%
   cpu1:     0.08%     1.45%     0.51%    97.89%     0.05%    0.00%     0.01%     0.00%
   cpu2:     0.05%     1.46%     0.40%    98.03%     0.05%    0.00%     0.01%     0.00%
   cpu3:     0.08%     1.64%     0.51%    97.71%     0.05%    0.00%     0.01%     0.00%
Average:       N/A       N/A       N/A       N/A       N/A       -         -       N/A
   Peak:       N/A       N/A       N/A       N/A       N/A       -         -       N/A

Overall current CPU utilization (100 - (Idle + IOwait))% : 2.05%

    User - Percent of CPU time that the system spent in user mode.
    Nice - Percent of CPU time that the system spent on low priority tasks.
  System - Percent of CPU time that the system spent in system mode.
    Idle - Percent of CPU time when the system is idle.
  IOwait - Percent of CPU time when the system is waiting for I/O to complete.
     IRQ - Percent of CPU time when the system is servicing interrupts.
 softIRQ - Percent of CPU time when the system is servicing softirqs.
   Steal - Percent of CPU time that the system spent on involuntary wait.
 Average - Average CPU utilization since reboot.
--More--
```


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CPU Utilization (Real Time)

```
POD3-674-EDGE#show processes cpu

CPU utilization:
CPU name      User      Nice   System     Idle   IOwait     IRQ  softIRQ    Steal
    cpu:     0.06%     1.51%     0.46%    97.90%     0.05%    0.00%     0.01%     0.00%
   cpu0:     0.05%     1.51%     0.42%    97.95%     0.05%    0.00%     0.03%     0.00%
   cpu1:     0.08%     1.45%     0.51%    97.89%     0.05%    0.00%     0.01%     0.00%
   cpu2:     0.05%     1.46%     0.40%    98.03%     0.05%    0.00%     0.01%     0.00%
   cpu3:     0.08%     1.64%     0.51%    97.71%     0.05%    0.00%     0.01%     0.00%
Average:       N/A       N/A       N/A       N/A       N/A       -         -       N/A
   Peak:       N/A       N/A       N/A       N/A       N/A       -         -       N/A

Overall current CPU utilization (100 - (Idle + IOwait))% : 2.05%

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   Steal - Percent of CPU time that the system spent on involuntary wait.
 Average - Average CPU utilization since reboot.
--More--
```


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Unix Top Command

```
WAE-674#top
top - 01:00:17 up 3 min,  2 users,  load average: 2.31, 0.89, 0.34
Tasks: 336 total,   4 running, 332 sleeping,   0 stopped,   0 zombie
Cpu(s):  0.5% us,  9.1% sy, 90.1% ni,  0.0% id,  0.0% wa,  0.0% hi,  0.3% si
Mem:   1938516k total,  1629396k used,   309120k free,    13628k buffers
Swap:  1938296k total,        0k used,  1938296k free,  1139008k cached

  PID USER      PR  NI  VIRT  RES  SHR S %CPU %MEM    TIME+  COMMAND
 9312 admin     30  10  431m 119m  21m R 30.5  6.3   0:06.14 java
 9313 admin     30  10  431m 119m  21m R 28.5
 9189 admin     30  10  338m  58m  19m S 18.2
 9383 admin     30  10  431m 119m  21m S 14.3
 9647 admin     30  10  431m 119m  21m R 11.9
 9629 admin     30  10  431m 119m  21m S  5.6
 9659 admin     30  10  431m 119m  21m S  5.6
 9100 admin     30  10  338m  58m  19m S  5.0
  962 admin     39  19     0    0    0 S  0.7
 8877 admin     30  10  681m 200m 4876 S  0.7 10.6   0:00.21 so_dre
 9030 admin     30  10  298m  43m  13m S  0.7  2.3   0:01.18 java
 9291 admin     30  10  431m 119m  21m S  0.7  6.3
 1787 admin     10 -10  4800  968  656 S  0.3  0.0
 1799 admin     30  10  3204 1544  664 S  0.3  0.1
```

us:%CPU time spent in user space
sy:%CPU time spent in kernel space.
ni:%CPU time spent on low priority processes.
id:%CPU time spent idle.
wa:%CPU time spent in wait (on disk).
hi:%CPU time spent handling hardware interrupts.
si:%CPU time spent handling software interrupts

R - Running
S - Sleeping
D - Uninterruptible sleep
T - Traced
Z - Zombie

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Platform

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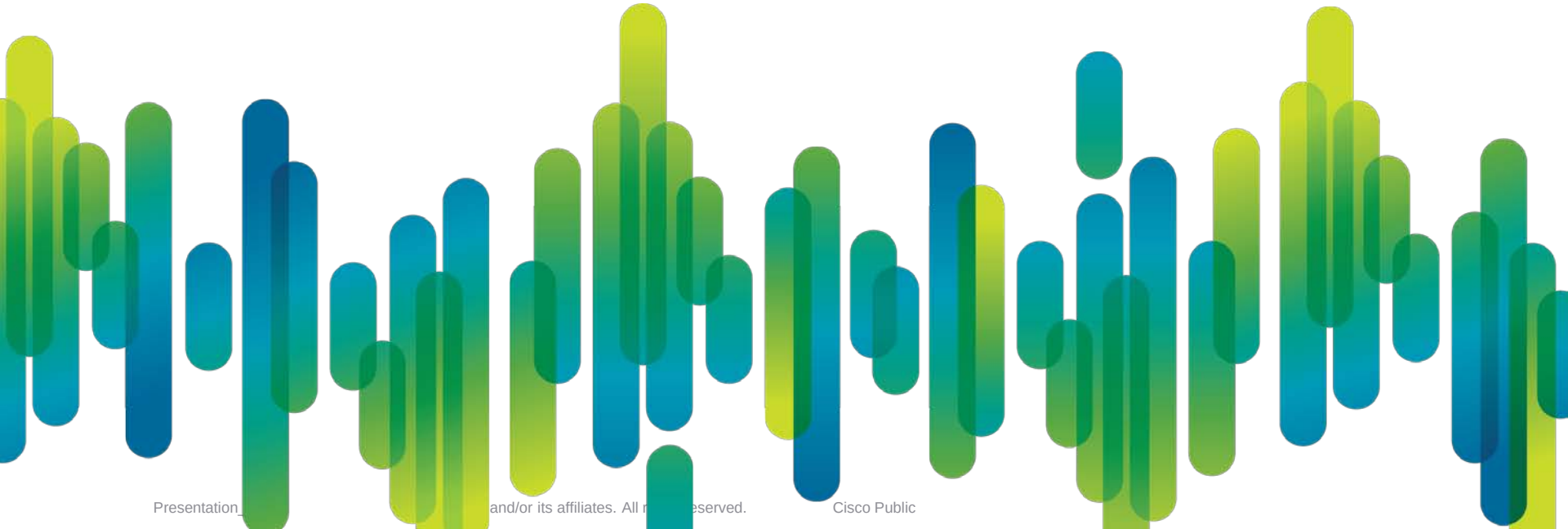

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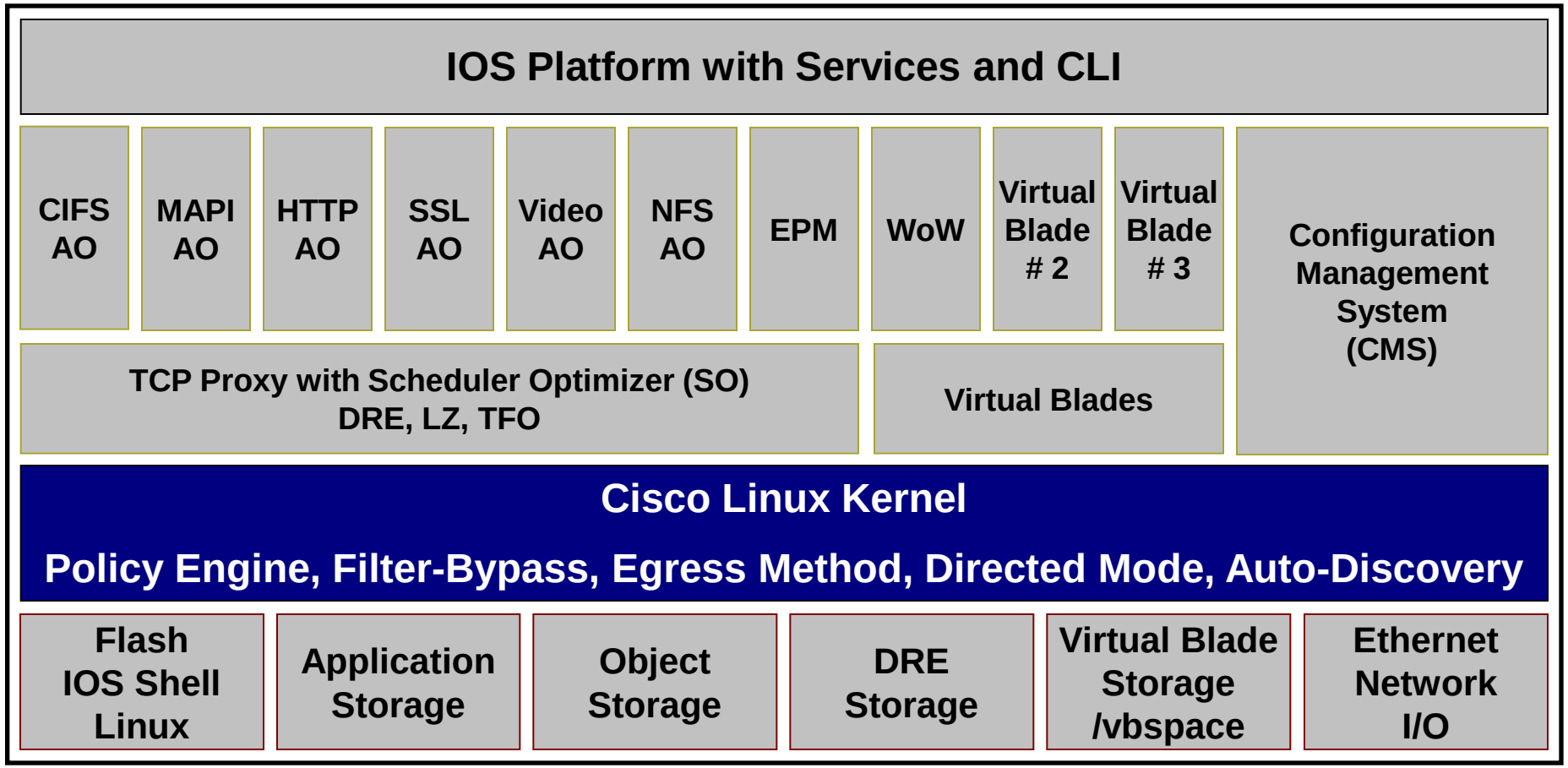

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WCCPv2 Verification

- Verification on Router and on WAE
- WCCP section is complemented by

  BRKAPP-2021 - Deploying and Troubleshooting WCCP
- Verify topology and Configuration

  Intercepting routers and WAEs on the same subnet?

  Use of IP addresses of LAN interfaces in router-list?

  Platform and SW version supports WCCP forwarding in HW?

  Redirection Loops?

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WCCPv2 Interception Verification

- show ip wccp [detail] provides WCCP inventory
  - Number of routers and WAEs or seach service group, packets re-directed in software, forwarding and return method
- L2 Forwarding and GRE Forwarding
- Hash assignment
  - On software IOS routers only
  - Verify hash allotment
- Mask assignment
  - On L3 switches and some IOS versions
  - Mask is configurable

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WCCPv2 Interception Verification (IOS)

```
Router# show ip wccp
Global WCCP information:
    Router information:
        Router Identifier:                    10.88.81.242
        Protocol Version:                     2.0

    Service Identifier: 61
        Number of Service Group Clients:      1
        Number of Service Group Routers:      1
        Total Packets s/w Redirected:         68755
          Process:                            2
          CEF:                                68753
        Service mode:                         Open
        Service access-list:                  -none-
        Total Packets Dropped Closed:         0
        Redirect access-list:                 -none-
        Total Packets Denied Redirect:        0
        Total Packets Unassigned:             0
        Group access-list:                    -none-
        Total Messages Denied to Group:       0
        Total Authentication failures:        0
        Total Bypassed Packets Received:      0
--More--
```

Client = WAE

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WCCPv2 Interception Verification (IOS)

```
Router# show ip wccp
Global WCCP information:
    Router information:
        Router Identifier:                    10.88.81.242
        Protocol Version:                     2.0

    Service Identifier: 61
        Number of Service Group Clients:      1
        Number of Service Group Routers:      1
        Total Packets s/w Redirected:         68755
          Process:                            2
          CEF:                                68753
        Service mode:                         Open
        Service access-list:                  -none-
        Total Packets Dropped Closed:         0
        Redirect access-list:
        Total Packets Denied Redirec
        Total Packets Unassigned:
        Group access-list:
        Total Messages Denied to Gro
        Total Authentication failures:        0
        Total Bypassed Packets Received:      0
--More--
```

Verify That Counters Are Incrementing on Software-Based Platforms (e.g. ISR)

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WCCPv2 Interception Verification (IOS)

```
Router# show ip wccp
Global WCCP information:
    Router information:
        Router Identifier:                    10.88.81.242
        Protocol Version:                     2.0

    Service Identifier: 61
        Number of Service Group Clients:      1
        Number of Service Group Routers:      1
        Total Packets s/w Redirected:         102
          Process:                            1
          CEF:                                101
        Service mode:                         Open
        Service access-list:                  -none-
        Total Packets Dropped Closed:         0
        Redirect access-list:
        Total Packets Denied Redirec
        Total Packets Unassigned:
        Group access-list:
        Total Messages Denied to Gro
        Total Authentication failures:        0
        Total Bypassed Packets Received:      0
--More--
```

Verify That Counters Are Not Incrementing on Hardware-Based Platforms (e.g. Cat6k)

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WCCPv2 Interception Verification (IOS)

```
Router# show ip wccp
Global WCCP information:
    Router information:
        Router Identifier:                    10.88.81.242
        Protocol Version:                     2.0

    Service Identifier: 61
        Number of Service Group Clients:
        Number of Service Group Routers:
        Total Packets s/w Redirected:
          Process:
          CEF:
        Service mode:                         Open
        Service access-list:                  -none-
        Total Packets Dropped Closed:         0
        Redirect access-list:                 -none-
        Total Packets Denied Redirect:        0
        Total Packets Unassigned:             0
        Group access-list:                    -none-
        Total Messages Denied to Group:       0
        Total Authentication failures:        0
        Total Bypassed Packets Received:      0
--More--
```

Counter Will Increment for Packets That Match Service Group but Do Not Match Redirect-List

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WCCPv2 Interception Verification (IOS)

```
Router# show ip wccp
Global WCCP information:
    Router information:
        Router Identifier:                    10.88.81.242
        Protocol Version:                     2.0

    Service Identifier: 61
        Number of Service Group Clients:      1
        Number of Service Group Routers:      1
        Total Packets s/w Redirected:         68755
          Process:
          CEF:
        Service mode:
        Service access-list:
        Total Packets Dropped Closed:         0
        Redirect access-list:                 -none-
        Total Packets Denied Redirect:        0
        Total Packets Unassigned:             0
        Group access-list:                    -none-
        Total Messages Denied to Group:       0
        Total Authentication failures:        0
        Total Bypassed Packets Received:      0
--More--
```

Increments for Every Packet Received with Incorrect Service Group Password

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Interception Verification (IOS) - SW

Verify WAE State in Service Group

```
Router# show ip wccp 61 detail
WCCP Client information:
        WCCP Client ID:          10.88.81.242
        Protocol Version:        2.0
        State:                   Usable
        Redirection:             GRE
        Packet Return:           GRE
        Assignment:              HASH
        Initial Hash Info:       FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
                                 FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
        Assigned Hash Info:      FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
                                 FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
        Hash Allotment:          256 (100.00%)
        Packets s/w Redirected:  68755
        Connect Time:            3w6d
        Bypassed Packets
          Process:               2
          CEF:                   68753
          Errors:                0
```

% of Hash Buckets Assigned

Current Time in the Service Group

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Interception Verification (IOS) - SW

- Hidden IOS command shows target WAE for src/dst IP address and port combination

```
show ip wccp <service> hash <dst-ip> <src-ip> <dst-port> <src-port>
```

```
Router# show ip wccp 61 hash 0.0.0.0 10.88.81.10 0 0
WCCP hash information for:
    Primary Hash:   Src IP: 10.88.81.10
         Bucket:   9
    WCCP Client: 10.88.81.12

Router#
```

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Interception Verification (IOS) - HW

```
Cat6k# sh ip wccp 61 det
WCCP Client information:
        WCCP Client ID:          10.88.80.135
        Protocol Version:        2.0
        State:                   Usable
        Redirection:             L2
        Packet Return:           GRE
        Packets Redirected:      0
        Connect Time:            1d18h
        Assignment:              MASK

        Mask  SrcAddr    DstAddr    SrcPort DstPort
        ----  -------    -------    ------- -------
        0000: 0x00000f00 0x00000000 0x0000  0x0000

        Value SrcAddr    DstAddr    SrcPort DstPort CE-IP
        ----- -------    -------    ------- ------- -----
        0000: 0x00000000 0x00000000 0x0000  0x0000  0x0A585087 (10.88.80.135)
        0001: 0x00000001 0x00000000 0x0000  0x0000  0x0A585087 (10.88.80.135)
        0002: 0x00000040 0x00000000 0x0000  0x0000  0x0A585087 (10.88.80.135)
        0003: 0x00000041 0x00000000 0x0000  0x0000  0x0A585087 (10.88.80.135)
```

Service group mask

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Interception Verification (IOS) - HW

- Catalyst 6500 / 7600 platforms are capable of WCCP in both software and hardware forwarding paths
- Inspecting TCAM programming shows whether WCCP is handled in software or hardware

```
Cat6k# show tcam interface Vlan900 acl in ip

* Global Defaults not shared


Entries from Bank 0


Entries from Bank 1

    permit        tcp host 10.88.80.135 any
    punt          ip any any (8 matches)

Cat6k#
```

'Punt' entries caused by:

- **Hash Assignment**
- **Outbound Redirection**
- **Redirect Exclude In**
- **Unknown WAE MAC**

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Interception Verification (IOS) - HW

```
Cat6k# sh tcam int vlan 900 acl in ip

* Global Defaults not shared


Entries from Bank 0


Entries from Bank 1

     permit       tcp host 10.88.80.135 any
     policy-route tcp any 0.0.0.0 255.255.232.190 (60 matches)
     policy-route tcp any 0.0.0.1 255.255.232.190 (8 matches)
     policy-route tcp any 0.0.0.64 255.255.232.190 (16 matches)
     policy-route tcp any 0.0.0.65 255.255.232.190 (19 matches)
     policy-route tcp any 0.0.1.0 255.255.232.190
     policy-route tcp any 0.0.1.1 255.255.232.190
     policy-route tcp any 0.0.1.64 255.255.232.190
     policy-route tcp any 0.0.1.65 255.255.232.190
     policy-route tcp any 0.0.2.0 255.255.232.190
     policy-route tcp any 0.0.2.1 255.255.232.190
     policy-route tcp any 0.0.2.64 255.255.232.190
     policy-route tcp any 0.0.2.65 255.255.232.190 (75 matches)
     policy-route tcp any 0.0.3.0 255.255.232.190 (222195 matches)
```

‘policy-route’ entries = full hardware redirection

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Interception Verification (IOS) - HW

```
Cat6k# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Cat6k(config)# service internal
Cat6k(config)# end
Cat6k#
```

```
Cat6k# show ip wccp 61 internal
Internal WCCP client information (1):
        Index:                      0
        WCCP Client ID:             10.88.80.135
        Protocol Version:           2.0
        State:                      0007 (AUV )
        Connect Time:               00:00:05
        Redirection:                L2
            MAC:                    0000.0000.0000
        Packet Return:              GRE
        L2 Address Changes:         0
        Assignment:                 MASK
        Redirect Assignments:
            Received:               0
            Invalid:                0
            Duplicate:              0
< snip >
Cat6k#
```

HIA from WAE must enter same interface that WAE MAC is known through

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WCCPv2 Interception Verification (WAE)

```
WAE-612# show wccp services
Services configured on this File Engine
        TCP Promiscuous 61
        TCP Promiscuous 62

WAE-612# show wccp status
WCCP version 2 is enabled and currently active

WAE-612# show wccp routers

Router Information for Service: TCP Promiscuous 61
 Routers Seeing this Wide Area Engine(1)
  Router Id      Sent To         Recv ID     AssKeyIP     AssKeyCN    MemberCN
  44.77.22.3   10.88.80.129    00090C46    10.88.80.133      1          5
 Routers not Seeing this Wide Area Engine
  -NONE-
 Routers Notified of from other WAE's
  -NONE-
 Multicast Addresses Configured
 -NONE-
```

Verify WCCP Is Configured and Enabled

Verify Bi-Directional Communication with WCCP-Enabled Routers

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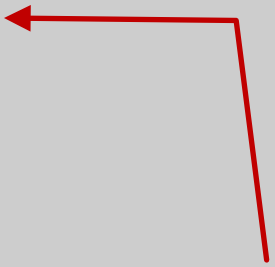
show wccp gre

```
WAE-612# show wccp gre
Transparent GRE packets received:                5531561
Transparent non-GRE packets received:            0
Transparent non-GRE non-WCCP packets received: 0
Total packets accepted:                          5051
Invalid packets received:                        0
Packets received with invalid service:           0
Packets received on a disabled service:          0
Packets received too small:                      0
Packets dropped due to zero TTL:                 0
Packets dropped due to bad buckets:              0
Packets dropped due to no redirect address:      0
Packets dropped due to loopback redirect:        0
Pass-through pkts dropped on assignment update:0
Connections bypassed due to load:                0
Packets sent back to router:                     0
GRE packets sent to router (not bypass)          0
Packets sent to another WAE:                     0
GRE fragments redirected:                        0
GRE encapsulated fragments received:             0
Packets failed encapsulated reassembly:          0
Packets failed GRE encapsulation:                0
--More--
```



Either of These Counters Should Be Incrementing If WCCP Redirection Is Working

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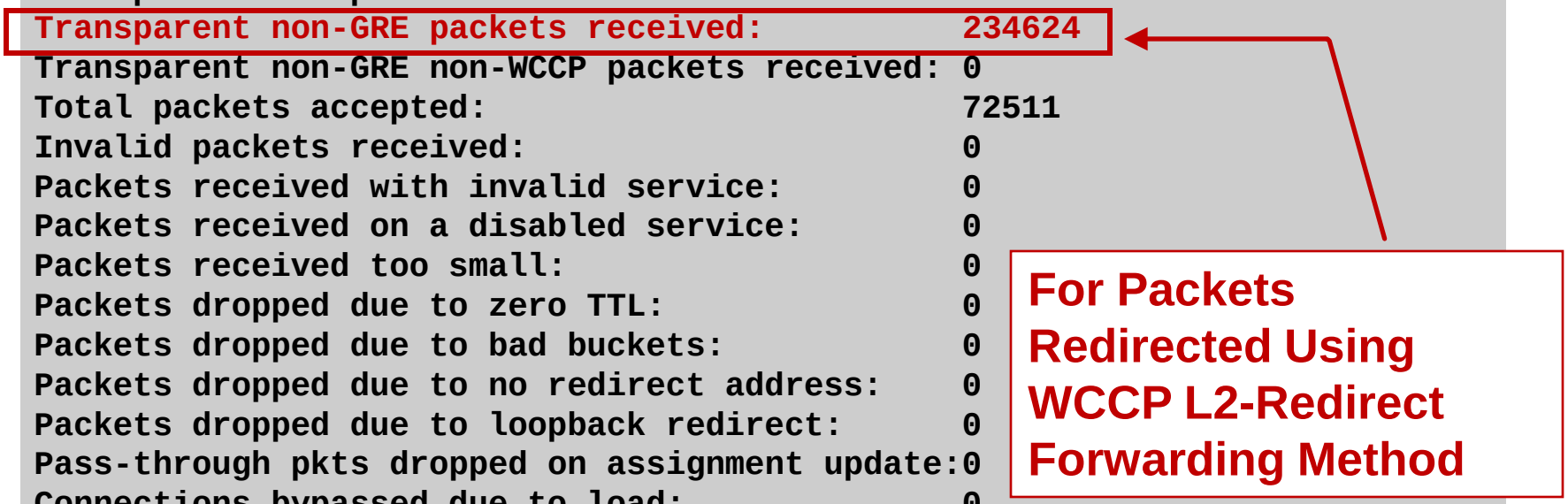
show wccp gre

```
WAE-612# show wccp gre
Transparent GRE packets received:                0
Transparent non-GRE packets received:            234624
Transparent non-GRE non-WCCP packets received: 0
Total packets accepted:                          72511
Invalid packets received:                        0
Packets received with invalid service:           0
Packets received on a disabled service:          0
Packets received too small:                      0
Packets dropped due to zero TTL:                 0
Packets dropped due to bad buckets:              0
Packets dropped due to no redirect address:      0
Packets dropped due to loopback redirect:        0
Pass-through pkts dropped on assignment update:0
Connections bypassed due to load:                0
Packets sent back to router:                     0
GRE packets sent to router (not bypass)          0
Packets sent to another WAE:                     0
GRE fragments redirected:                        0
GRE encapsulated fragments received:             0
Packets failed encapsulated reassembly:          0
Packets failed GRE encapsulation:                0
--More--
```



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show wccp gre

```
WAE-612# show wccp gre
Transparent GRE packets received:                0
Transparent non-GRE packets received:            0
Transparent non-GRE non-WCCP packets received: 102764
Total packets accepted:                          98723
Invalid packets received:                        0
Packets received with invalid service:           0
Packets received on a disabled service:          0
Packets received too small:                      0
Packets dropped due to zero TTL:                 0
Packets dropped due to bad buckets:              0
Packets dropped due to no redirect address:      0
Packets dropped due to loopback redirect:        0
Pass-through pkts dropped on assignment update:0
Connections bypassed due to load:                0
Packets sent back to router:                     0
GRE packets sent to router (not bypass)          0
Packets sent to another WAE:                     0
GRE fragments redirected:                        0
GRE encapsulated fragments received:             0
Packets failed encapsulated reassembly:          0
Packets failed GRE encapsulation:                0
--More--
```

For Packets L2 Redirected Using Non-WCCP (L4, PBR, Etc.) Interception Method

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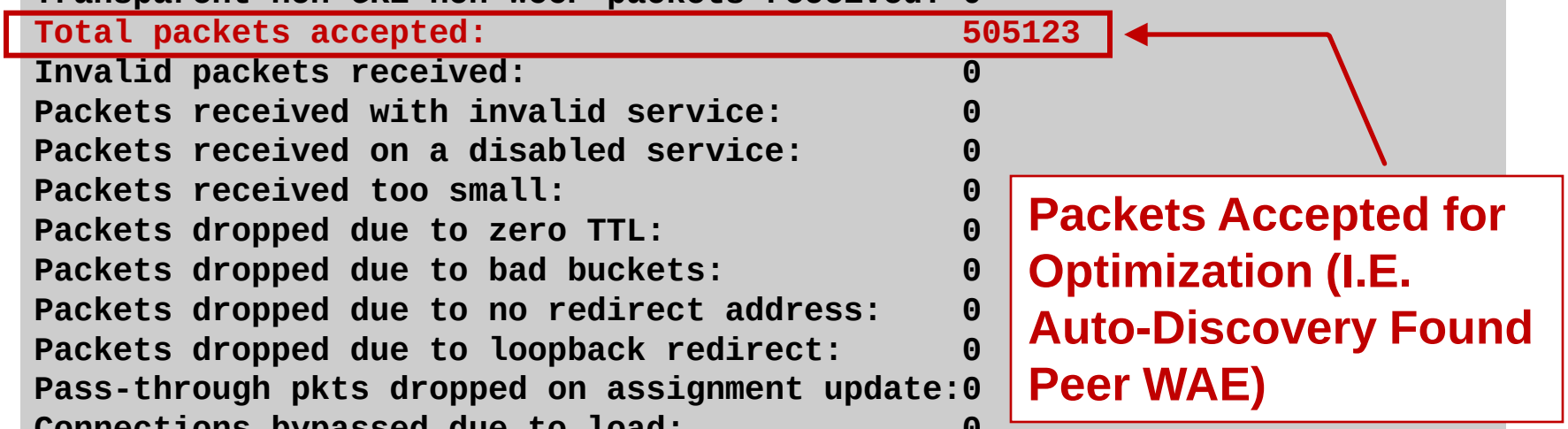
show wccp gre

```
WAE-612# show wccp gre
Transparent GRE packets received:                753110
Transparent non-GRE packets received:            0
Transparent non-GRE non-WCCP packets received:   0
Total packets accepted:                          505123
Invalid packets received:                        0
Packets received with invalid service:           0
Packets received on a disabled service:          0
Packets received too small:                      0
Packets dropped due to zero TTL:                 0
Packets dropped due to bad buckets:              0
Packets dropped due to no redirect address:      0
Packets dropped due to loopback redirect:        0
Pass-through pkts dropped on assignment update:0
Connections bypassed due to load:                0
Packets sent back to router:                     0
GRE packets sent to router (not bypass)          0
Packets sent to another WAE:                     0
GRE fragments redirected:                        0
GRE encapsulated fragments received:             0
Packets failed encapsulated reassembly:          0
Packets failed GRE encapsulation:                0
--More--
```



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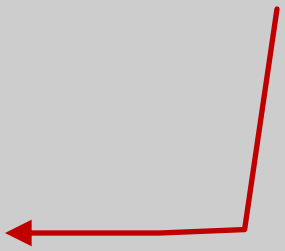
show wccp gre

```
WAE-612# show wccp gre
Transparent GRE packets received:                345678
Transparent non-GRE packets received:            0
Transparent non-GRE non-WCCP packets received:   0
Total packets accepted:                          5051
Invalid packets received:                        0
Packets received with invalid service:           0
Packets received on a disabled service:          0
Packets received too small:                      0
Packets dropped due to zero TTL:                 0
Packets dropped due to bad buckets:              0
Packets dropped due to no redirect address:      0
Packets dropped due to loopback redirect:        0
Pass-through pkts dropped on assignment update:0
Connections bypassed due to load:                0
Packets sent back to router:                     0
GRE packets sent to router (not bypass)          234514
Packets sent to another WAE:                     0
GRE fragments redirected:                        0
GRE encapsulated fragments received:             0
Packets failed encapsulated reassembly:          0
Packets failed GRE encapsulation:                0
--More--
```

Only Includes Packets Handled Using WCCP Return Egress Method



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show wccp gre

```
WAE-612# show wccp gre
Transparent GRE packets received:                23534
Transparent non-GRE packets received:            0
Transparent non-GRE non-WCCP packets received:   0
Total packets accepted:                          5051
Invalid packets received:                        0
Packets received with invalid service:           0
Packets received on a disabled service:          0
Packets received too small:                      0
Packets dropped due to zero TTL:                 0
Packets dropped due to bad buckets:              0
Packets dropped due to no redirect address:      0
Packets dropped due to loopback redirect:        0
Pass-through pkts dropped on assignment update:0
Connections bypassed due to load:                0
Packets sent back to router:                     0
GRE packets sent to router (not bypass)          0
Packets sent to another WAE:                     1444
GRE fragments redirected:                        0
GRE encapsulated fragments received:             0
Packets failed encapsulated reassembly:          0
Packets failed GRE encapsulation:                0
--More--
```

Packets Forwarded Directly Between WAE's Due to WCCP Flow Protection

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Egress Method Mismatch

- Only WCCP GRE Return is supported as a ‘negotiated-return’ egress method
  - WAE raises minor alarm if negotiated return method is L2
- Generic GRE egress method only supports WCCP GRE as the intercept-method
  - WAE raises minor alarm if negotiated intercept method is L2
- Alarm cleared when mismatch is resolved by altering the egress method and/or WCCP configuration
- Verify configured and used egress method with **sh egress-method** CLI command

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Egress Method

```
WAE674# show egress-methods

Intercept method : WCCP

  TCP Promiscuous 61 :
      WCCP negotiated return method : WCCP GRE

                          Egress Method      Egress Method
      Destination          Configured            Used
      -----------  ----------------------  -------------
      any          WCCP Negotiated Return  WCCP GRE

  TCP Promiscuous 62 :
      WCCP negotiated return method : WCCP GRE

                          Egress Method      Egress Method
      Destination          Configured            Used
      -----------  ----------------------  -------------
      any          WCCP Negotiated Return  WCCP GRE

< snip >

WAE674#
```

IP Forwarding, WCCP GRE, or Generic GRE

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Egress Method – Mismatch

```
WAE612# sh egress-methods
Intercept method : WCCP
  TCP Promiscuous 61 :
      WCCP negotiated return method : WCCP GRE

                       Egress Method      Egress Method
      Destination       Configured            Used
      -----------  ---------------------  -------------
      any          Generic GRE            IP Forwarding
      WARNING:  WCCP has negotiated WCCP L2 as the intercept method for
                which generic GRE is not supported as an egress method
                in this release. This device uses IP forwarding as the
                egress method instead of the configured generic GRE
                egress method.
  TCP Promiscuous 62 :
      WCCP negotiated return method : WCCP GRE
                       Egress Method      Egress Method
      Destination       Configured            Used
      -----------  ---------------------  -------------
      any          Generic GRE            IP Forwarding
      WARNING:  WCCP has negotiated WCCP L2 as the intercept method for
                which generic GRE is not supported as an egress method
                in this release. This device uses IP forwarding as the
                egress method instead of the configured generic GRE
                egress method.
```


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Inline Interception

```
WAE-612# show interface inlineGroup 1/0

Interface is in intercept operating mode.
Standard NIC mode is off.
Disable bypass mode is off.
VLAN IDs configured for inline interception: All
Watchdog timer is enabled.
Timer frequency: 1600 ms.
Autoreset frequency 500 ms.
The watchdog timer will expire in 1452 ms.
WAE-612#
```

Intercept Operating Mode or Bypass Operating Mode

Check vlan(s)

- **Intercept operating mode** – Packet are passed to WAAS for (potential) optimization
- **Bypass operating mode** – Mechanical bypass between ports in InlineGroup during failure or admin shutdown

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show interface inlinePort

```
WAE-612# show interface inlinePort 1/0/wan
Device name          : eth4. Bypass master interface.
Packets Received     : 54231
Packets Intercepted: 0
Packets Bridged      : 54231
Packets Forwarded    : 0
Packets Dropped      : 0
Packets Received on native       : 0
Active flows for this interface : 0
...

WAE-612# show interface inlinePort 1/0/lan
Device name          : eth5. Bypass slave interface.
Packets Received     : 334602
Packets Intercepted: 0
Packets Bridged      : 334599
Packets Forwarded    : 0
Packets Dropped      : 3
Packets Received on native       : 0
Active flows for this interface : 0
...
WAE-612#
```

Use ‘sh int inlinep’ to Determine Device Name for Any InlinePort The Device Name Is Needed for Packet Captures

Traffic intercepted on the inlinePort interface should be seen as incrementing – i.e. being inspected

Traffic bridged is non tcp or not being inspected

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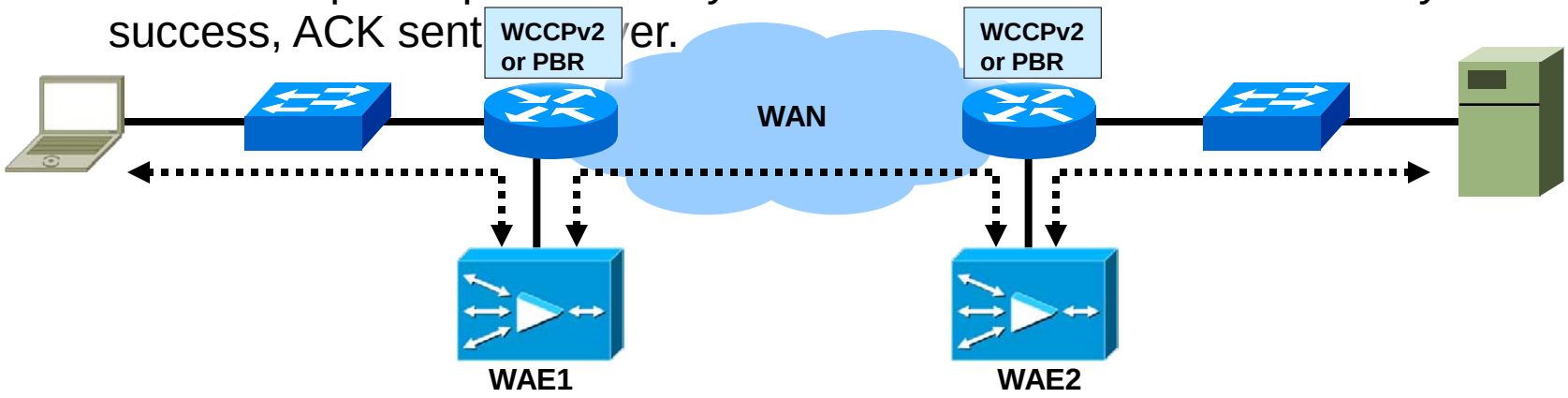
Auto Discovery - Refresher

- Client's SYN forwarded by WAE1 with Auto Discovery Options
- SYN forwarded again by WAE2 with Auto Discovery Options
- SYN/ACK processed by WAE2, Auto Discovery Options added
- SYN/ACK processed by WAE1, to determine Auto Discovery success, SYN/ACK sent to Client and ACK with options sent to WAE2
- ACK with options processed by WAE2 to determine Auto Discovery success, ACK sent [illegible]er.



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Automatic Discovery Verification

No.	Time	Source	Destination	Protocol	Info
72	71.920126	10.10.13.100	10.10.10.100	TCP	1345 > http [SYN] Seq=0 Ack=0 Win=65535 Len=0 MS

```
⊞ Frame 72 (78 bytes on wire, 78 bytes captured)
⊞ Ethernet II, Src: Ibm_84:34:c8 (00:0d:60:84:34:c8), Dst: Cisco_2e:21:90 (00:0a:b8:2e:21:90)
⊞ Internet Protocol, Src: 10.10.13.100 (10.10.13.100), Dst: 10.10.10.100 (10.10.10.100)
⊟ Transmission Control Protocol, Src Port: 1345 (1345), Dst Port: http (80), Seq: 0, Ack: 0, Len: 0
    Source port: 1345 (1345)
    Destination port: http (80)
    Sequence number: 0    (relative sequence number)
    Header length: 44 bytes
  ⊞ Flags: 0x0002 (SYN)
    Window size: 65535
    Checksum: 0x4874 [correct]
  ⊟ Options: (24 bytes)
      Maximum segment size: 1460 bytes
      NOP
      Window scale: 2 (multiply by 4)
      NOP
      NOP
      Time stamp: tsval 0, tsecr 0
      NOP
      NOP
      SACK permitted
```


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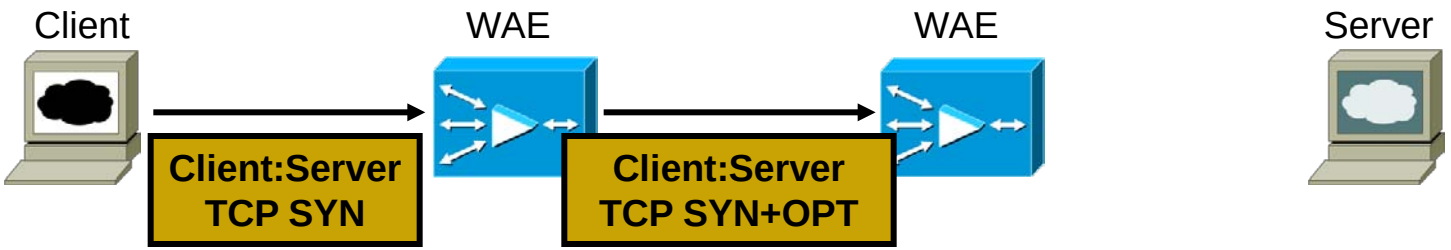
Automatic Discovery Verification



No.	Time	Source	Destination	Protocol	Info
320	55.010872	10.10.13.100	10.10.10.100	TCP	1345 > http [SYN] Seq=0 Ack=0 Win=65535 Len=0 MSS=14
321	55.010943	10.10.13.100	10.10.10.100	TCP	1345 > http [SYN] Seq=0 Ack=0 Win=262140 Len=0 MSS=1

```
⊞ Frame 321 (90 bytes on wire, 90 bytes captured)
⊞ Ethernet II, Src: Ibm_ac:3c:5c (00:11:25:ac:3c:5c), Dst: Cisco_2e:21:90 (00:0a:b8:2e:21:90)
⊞ Internet Protocol, Src: 10.10.13.100 (10.10.13.100), Dst: 10.10.10.100 (10.10.10.100)
⊟ Transmission Control Protocol, Src Port: 1345 (1345), Dst Port: http (80), Seq: 0, Ack: 0, Len: 0
    Source port: 1345 (1345)
    Destination port: http (80)
    Sequence number: 0    (relative sequence number)
    Header length: 56 bytes
  ⊞ Flags: 0x0002 (SYN)
    Window size: 262140 (scaled)
    Checksum: 0xd40d [correct]
  ⊟ Options: (36 bytes)
      Maximum segment size: 1432 bytes
      NOP
      Window scale: 2 (multiply by 4)
      NOP
      NOP
      Time stamp: tsval 0, tsecr 0
      NOP
      NOP
      SACK permitted
      Unknown (0x21) (12 bytes)
```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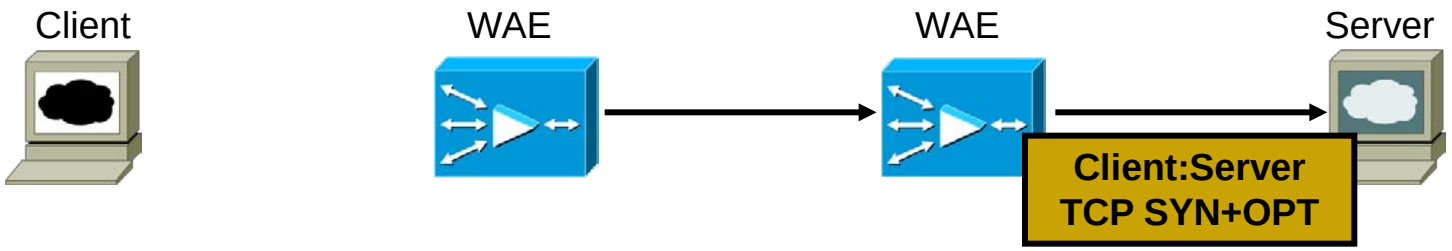
Automatic Discovery Verification



No.	Time	Source	Destination	Protocol	Info
8	7.801317	10.10.13.100	10.10.10.100	TCP	1345 > http [SYN] Seq=0 Ack=0 Win=65535 Len=0 MSS=1432 WS=2

```
⊞ Frame 8 (90 bytes on wire, 90 bytes captured)
⊞ Ethernet II, Src: 00:17:94:15:4f:20 (00:17:94:15:4f:20), Dst: server.peap.local (00:11:25:aa:9f:9e)
⊞ Internet Protocol, Src: 10.10.13.100 (10.10.13.100), Dst: 10.10.10.100 (10.10.10.100)
⊟ Transmission Control Protocol, Src Port: 1345 (1345), Dst Port: http (80), Seq: 0, Ack: 0, Len: 0
    Source port: 1345 (1345)
    Destination port: http (80)
    Sequence number: 0    (relative sequence number)
    Header length: 56 bytes
  ⊞ Flags: 0x0002 (SYN)
    Window size: 65535
    Checksum: 0xd40d [correct]
  ⊟ Options: (36 bytes)
      Maximum segment size: 1432 bytes
      NOP
      Window scale: 2 (multiply by 4)
      NOP
      NOP
      Time stamp: tsval 0, tsecr 0
      NOP
      NOP
      SACK permitted
      Unknown (0x21) (12 bytes)
```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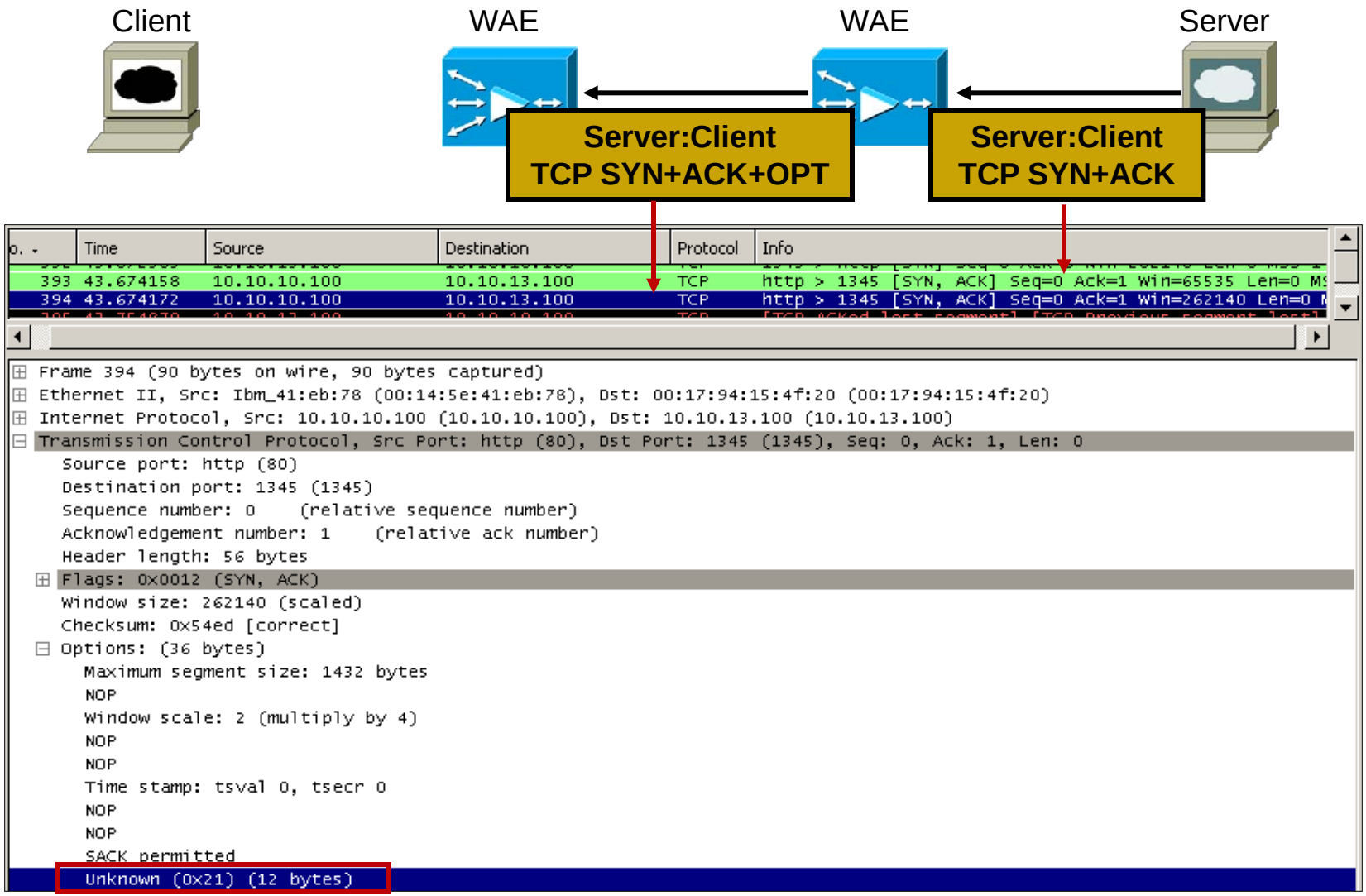
Automatic Discovery Verification



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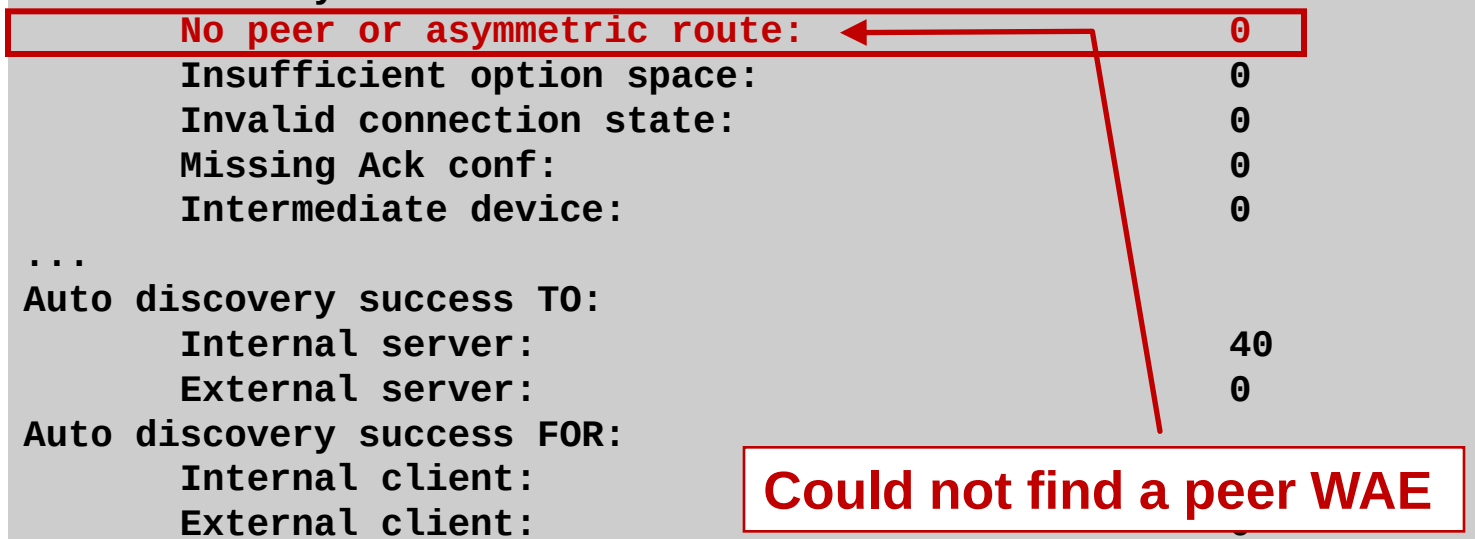
Auto-Discovery Statistics

```
WAE-674# show stat auto-discovery
...
Auto discovery failure:
       No peer or asymmetric route:                0
       Insufficient option space:                  0
       Invalid connection state:                   0
       Missing Ack conf:                           0
       Intermediate device:                        0
...
Auto discovery success TO:
       Internal server:                            40
       External server:                            0
Auto discovery success FOR:
       Internal client:
       External client:
Auto discovery success SYN retransmission:
       Zero retransmit:                            2902
       One retransmit:                             0
       Two+ retransmit:                            0
Auto discovery Miscellaneous:
       RST received:                               0
       SYNs found with our device id:              0
       SYN retransmit count resets:                0
```



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Auto-Discovery Statistics

```
WAE-674# show stat auto-discovery
...
Auto discovery failure:
       No peer or asymmetric route:                    0
       Insufficient option space:                      0
       Invalid connection state:                       0
       Missing Ack conf:                               0
       Intermediate device:                            0
...
Auto discovery success TO:
       Internal server:                               40
       External server:                                0
Auto discovery success FOR:
       Internal client:                             2902
       External client:
Auto discovery success SYN retransmission:
       Zero retransmit:
       One retransmit:
       Two+ retransmit:
Auto discovery Miscellaneous:
       RST received:                                   0
       SYNs found with our device id:                  0
       SYN retransmit count resets:                    0
```

Not enough space in TCP Options header for AD option

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Auto-Discovery Statistics

```
WAE-674# show stat auto-discovery
...
Auto discovery failure:
       No peer or asymmetric route:                0
       Insufficient option space:                  0
       Invalid connection state:                   0
       Missing Ack conf:                           0
       Intermediate device:                        0
...
Auto discovery success TO:
       Internal server:                            40
       External server:                            0
Auto discovery success FOR:
       Internal client:                            2902
       External client:
Auto discovery success SYN retransmission:
       Zero retransmit:
       One retransmit:                             0
       Two+ retransmit:                            0
Auto discovery Miscellaneous:
       RST received:                               0
       SYNs found with our device id:              0
       SYN retransmit count resets:                0
```

The WAE is not closest to the server or client

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Auto-Discovery Statistics

```
WAE-674# show stat auto-discovery
...
Auto discovery failure:
       No peer or asymmetric route:                    0
       Insufficient option space:                      0
       Invalid connection state:                       0
       Missing Ack conf:                               0
       Intermediate device:                            0
...
Auto discovery success TO:
       Internal server:
       External server:
Auto discovery success FOR:
       Internal client:
       External client:                                0
Auto discovery success SYN retransmission:
       Zero retransmit:                                2902
       One retransmit:                                 0
       Two+ retransmit:                                0
Auto discovery Miscellaneous:
       RST received:                                   0
       SYNs found with our device id:                  0
       SYN retransmit count resets:                    0
```

Packet received with our own TCP option - indicates a redirection loop

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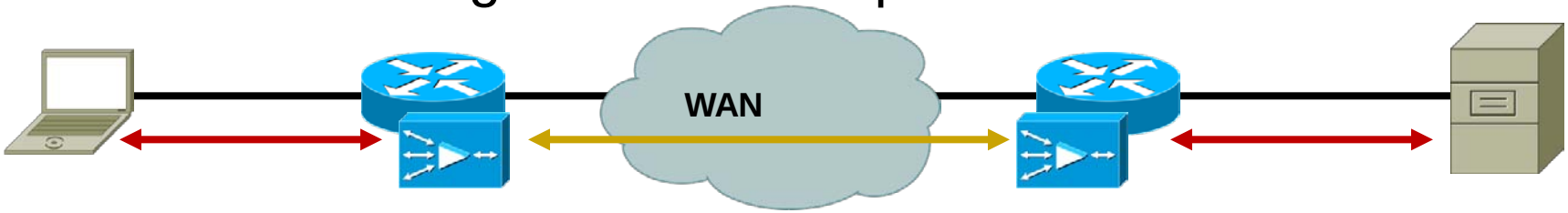
Redirection Problems

- During normal operation, there are 3 different connection segments for an optimized flow



- In the event of an interception failure, packets from an original connection could be received on the optimized segment by a peer WAE

```
%WAAS-SYS-3-900000:src=10.56.46.183:4386
dst=10.56.46.164:445 Unoptimised packet received on
optimized socket: seq=2796284443 end_seq=279628444
```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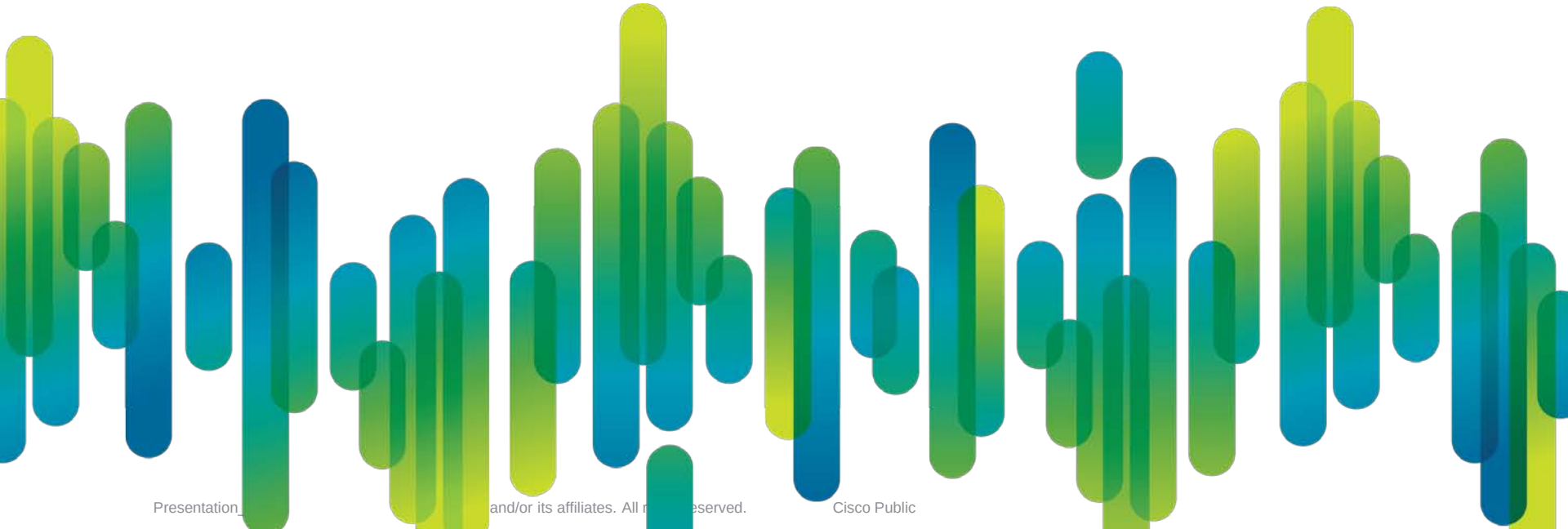
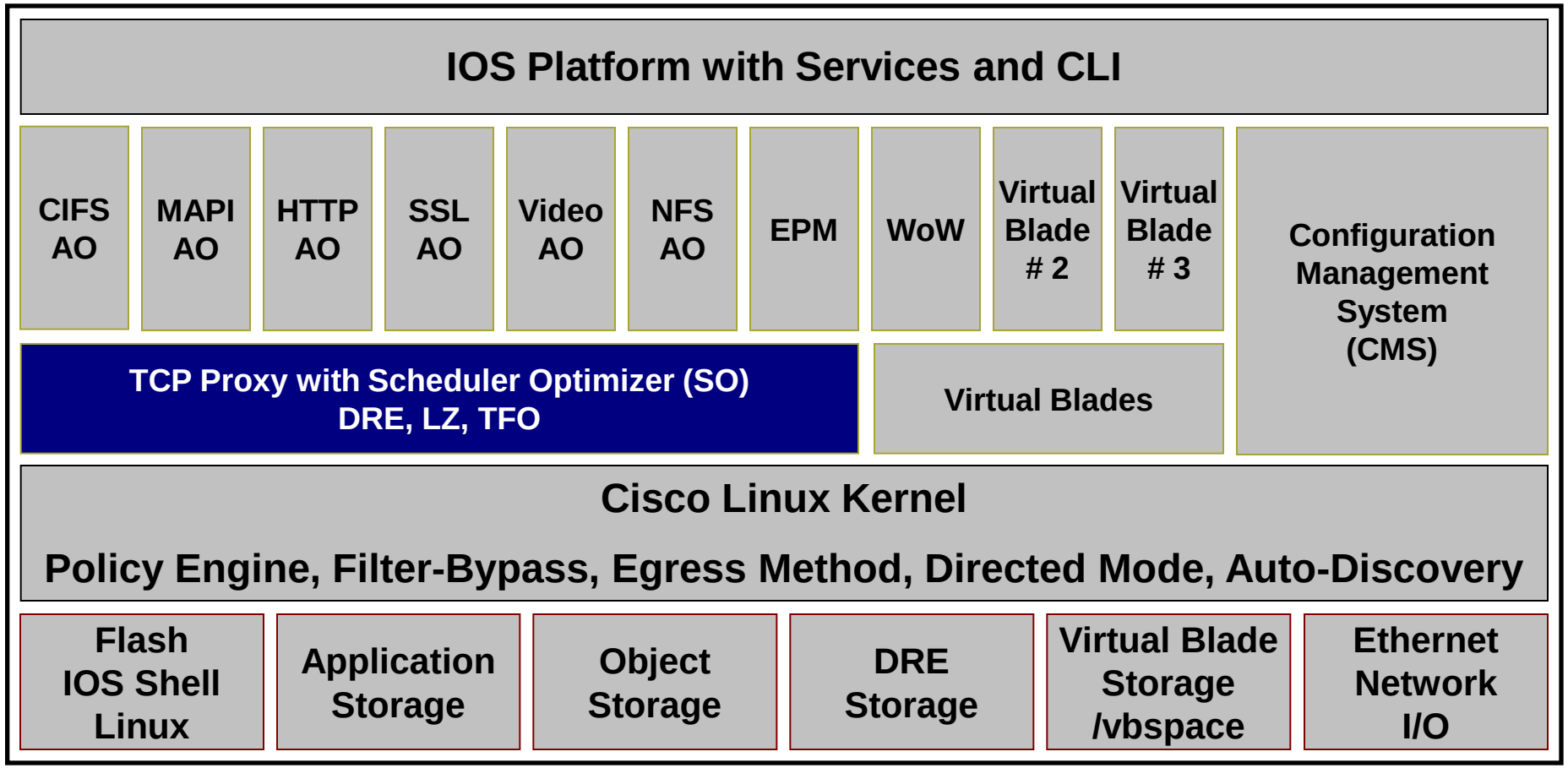
Transport Optimizations

WAE Overview
Diagnostic Reports
Physical Components
Platform
> Transport Optimizations
Application Acceleration
Packet Capture Debugs
Summary



Wide Area Application Engine (WAE)



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Verify Global TFO Status

```
WAE674# show statistics tfo
  Total number of connections                                : 108
  No. of active connections                                  : 1
  No. of pending (to be accepted) connections                : 0
  No. of bypass connections                                  : 1
  No. of normal closed conns                                 : 96
  No. of reset connections                                   : 11
     Socket write failure                                    : 4
     Socket read failure
     WAN socket close while
     AO socket close while w
     WAN socket error close while waiting to read            : 0
     AO socket error close while wai
     DRE decode failure
     DRE encode failure
     Connection init failure
     WAN socket unexpected close while waiting to read       : 5
     Exceeded maximum number of supported connections        : 0
     Buffer allocation or manipulation failed                : 0
     Peer received reset from end host
     DRE connection state out of sync
     Memory allocation failed for buffer heads               : 0
     Unoptimized packet received on optimized side           : 0
  <snip>
```

Total number of TCP optimized connections

Total number of TCP connections that were optimized since the last TFO statistics reset.

Overload Indicator

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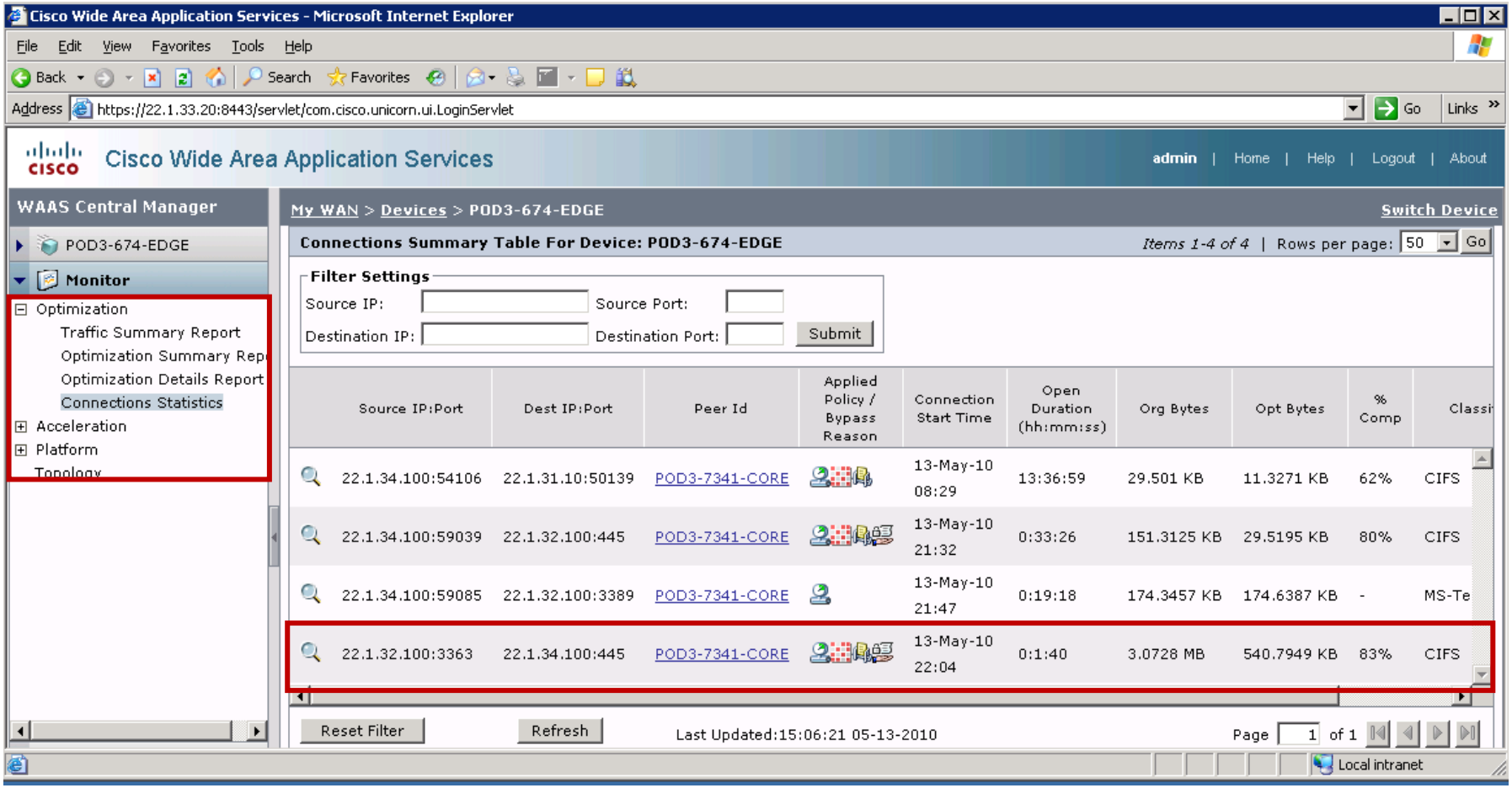
Pass Through Statistics

```
POD3-674-EDGE# show statistics pass-through
                     Outbound
                     ----------------------
PT Client:
     Bytes                            5161
     Packets                            58
PT Server:
     Bytes                          156109
     Packets                          2191
PT In Progress:
     Bytes                        25962337
     Packets                        197369

                     Active                  Completed
                     ----------------------  ----------------------
Overall                                   1                  13180
No Peer                                   0                    730
Rjct Capabilities                         0                      0
Rjct Resources                            0                      0
Rjct No License                           0                      0
App Config                                0                      0
Global Config                             0                      0
Asymmetric                                0                     11
In Progress                               1                  12439
Intermediate                              0                      0
Internal Error                            0                      0
App Override                              0                      0
Server Black List                         0                      0
AD Version Mismatch                       0                      0
AD AO Incompatible                        0                      0
AD AOIM Progress                          0                      0
DM Version Mismatch                       0                      0
Peer Override                             0                      0
Bad AD Options                            0                      0
Non-optimizing Peer                       0                      0
Interception ACL                          0                      0
```

Active and historical pass-through connection counts

CM Connection Statistics


Cisco Wide Area Application Services - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address https://22.1.33.20:8443/servlet/com.cisco.unicorn.ui.LoginServlet
Go Links
Cisco Wide Area Application Services
admin | Home | Help | Logout | About
WAAS Central Manager
POD3-674-EDGE
Monitor
Optimization
Traffic Summary Report
Optimization Summary Rep
Optimization Details Report
Connections Statistics
Acceleration
Platform
Topology
My WAN > Devices > POD3-674-EDGE
Switch Device
Connections Summary Table For Device: POD3-674-EDGE
Items 1-4 of 4 | Rows per page: 50 Go
Filter Settings
Source IP: Source Port:
Destination IP: Destination Port: Submit
Source IP:Port
Dest IP:Port
Peer Id
Applied Policy / Bypass Reason
Connection Start Time
Open Duration (hh:mm:ss)
Org Bytes
Opt Bytes
% Comp
Classi
22.1.34.100:54106 22.1.31.10:50139 POD3-7341-CORE 13-May-10 08:29 13:36:59 29.501 KB 11.3271 KB 62% CIFS
22.1.34.100:59039 22.1.32.100:445 POD3-7341-CORE 13-May-10 21:32 0:33:26 151.3125 KB 29.5195 KB 80% CIFS
22.1.34.100:59085 22.1.32.100:3389 POD3-7341-CORE 13-May-10 21:47 0:19:18 174.3457 KB 174.6387 KB - MS-Te
22.1.32.100:3363 22.1.34.100:445 POD3-7341-CORE 13-May-10 22:04 0:1:40 3.0728 MB 540.7949 KB 83% CIFS
Reset Filter Refresh Last Updated:15:06:21 05-13-2010
Page 1 of 1
Local intranet

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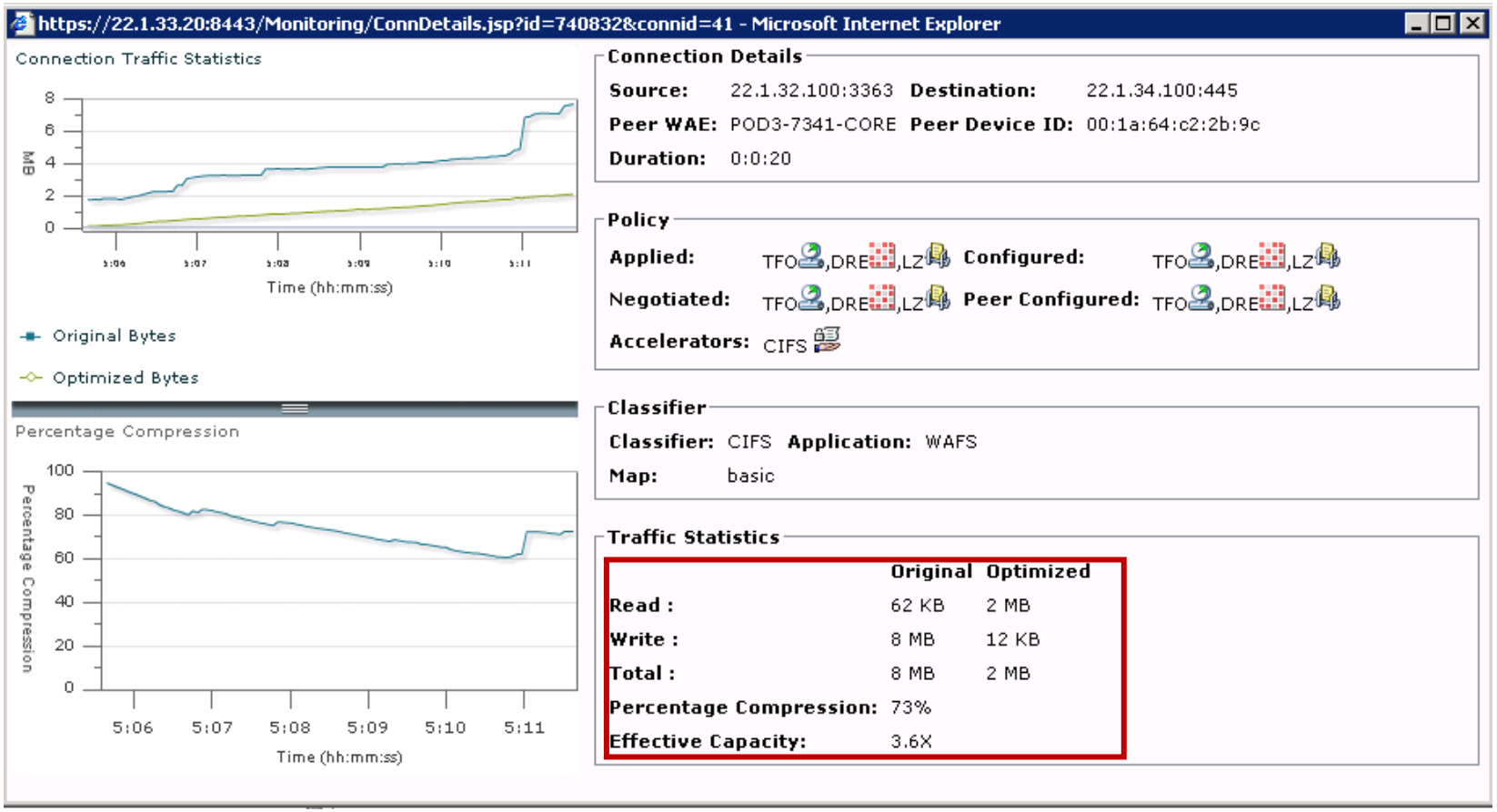
CM Connection Detail View



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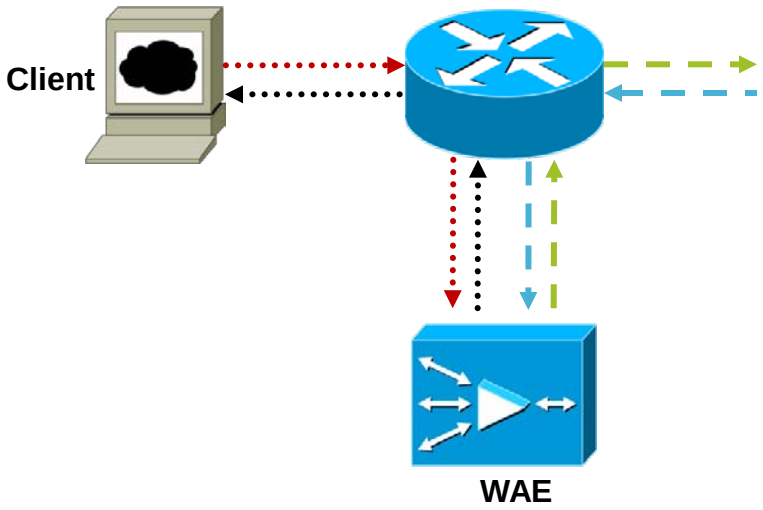
CM Connection Statistics



Traffic Statistics

	Original	Optimized
Read :	62 KB	2 MB
Write :	8 MB	12 KB
Total :	8 MB	2 MB
Percentage Compression:	73%	
Effective Capacity:	3.6X	

$$CompressionRatio = \frac{OptimizedReadBytes + OptimizedWriteBytes}{OriginalReadBytes + OriginalWriteBytes}$$

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Connection Statistics

```
POD3-674-EDGE# show statistics connection

Current Active Optimized Flows:                    3
   Current Active Optimized TCP Plus Flows:        2
   Current Active Optimized TCP Only Flows:        0
   Current Active Optimized TCP Preposition Flows: 0
Current Active Auto-Discovery Flows:               0
Current Reserved Flows:                            15
Current Active Pass-Through Flows:                 5
Historical Flows:                                  11

D:DRE,L:LZ,T:TCP Optimization RR:Total Reduction Ratio
A:AOIM,C:CIFS,E:EPM,G:GENERIC,H:HTTP,M:MAPI,N:NFS,S:SSL,V:VIDEO

ConnID       Source IP:Port          Dest IP:Port            PeerID Accel RR
     4    22.1.34.100:16104    22.1.31.10:50139 00:1a:64:c2:2b:9c TDL   00.0%
    11     22.1.32.100:1231     22.1.34.100:445 00:1a:64:c2:2b:9c TCDL  66.0%
    13     22.1.32.100:1556      22.1.34.100:80 00:1a:64:c2:2b:9c THDL  96.1%

Local IP:Port         Remote IP:Port        Peer ID           ConnType
192.168.1.2:11821     22.1.33.21:443        N/A               PT In Progress
192.168.1.2:54907     22.1.33.20:443        N/A               PT In Progress
--More--
```


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Detailed Connection Statistics

```
POD3-674-EDGE# show  statistics connection conn-id 13

Connection Id:              13
    Peer Id:                    00:1a:64:c2:2b:9c
    Connection Type:            EXTERNAL CLIENT
    Start Time:                 Wed May 12 10:39:11 2010
    Source IP Address:          22.1.32.100
    Source Port Number:         1556
    Destination IP Address:     22.1.34.100
    Destination Port Number:    80
    Application Name:           Web
    Classifier Name:            HTTP
    Map Name:                   basic
    Directed Mode:              FALSE
    Preposition Flow:           FALSE
    Policy Details:
           Configured:          TCP_OPTIMIZE + DRE + LZ
              Derived:          TCP_OPTIMIZE + DRE + LZ
                 Peer:          TCP_OPTIMIZE + DRE + LZ
           Negotiated:          TCP_OPTIMIZE + DRE + LZ
              Applied:          TCP_OPTIMIZE + DRE + LZ
    Accelerator Details:
                 Configured:    HTTP
                    Derived:    HTTP
                    Applied:    HTTP
                       Hist:    None

                                    Original            Optimized
                            --------------------  --------------------
    Bytes Read:                              902                210275
    Bytes Written:                       2293934                  1000

    Total Reduction Ratio: 90.793%
```

Application & classifier

Configured and negotiated policies

AO Applied

Bytes read and written on optimized and non-optimized sockets

Detailed Connection Statistics

```
<continued>

DRE : 13

Conn-ID: 13 22.1.32.100:1555 -- 22.1.34.100:80  Peer No:  0 Status: Active
------------------------------------------------------------------------------
Open at 05/12/2010 10:39:11, Still active
Encode:
   Overall: msg:          5, in:   1422 B, out:    642 B, ratio:  54.85%
       DRE: msg:          0, in:      0 B, out:      0 B, ratio:   0.00%
DRE Bypass: msg:          5, in:   1422 B
        LZ: msg:          3, in:   1478 B, out:    620 B, ratio:  58.05%
 LZ Bypass: msg:          2, in:      0 B
    Avg latency:      0.094 ms     Delayed msg:          0
  Encode th-put:   2948 KB/s
  Message size distribution:
    0-1K=0%  1K-5K=0%  5K-15K=0%  15K-25K=0%  25K-40K=0%  >40K=0%
Decode:
   Overall: msg:         53, in:    133 KB, out:   2257 KB, ratio:  94.11%
       DRE: msg:         52, in:    147 KB, out:   2256 KB, ratio:  93.48%
DRE Bypass: msg:          5, in:    924 B
        LZ: msg:          6, in:   5772 B, out:  21085 B, ratio:  72.63%
 LZ Bypass: msg:         47, in:    127 KB
    Avg latency:      0.641 ms
  Decode th-put:  66404 KB/s
  Message size distribution:
    0-1K=2%  1K-5K=0%  5K-15K=4%  15K-25K=13%  25K-40K=29%  >40K=50%
```


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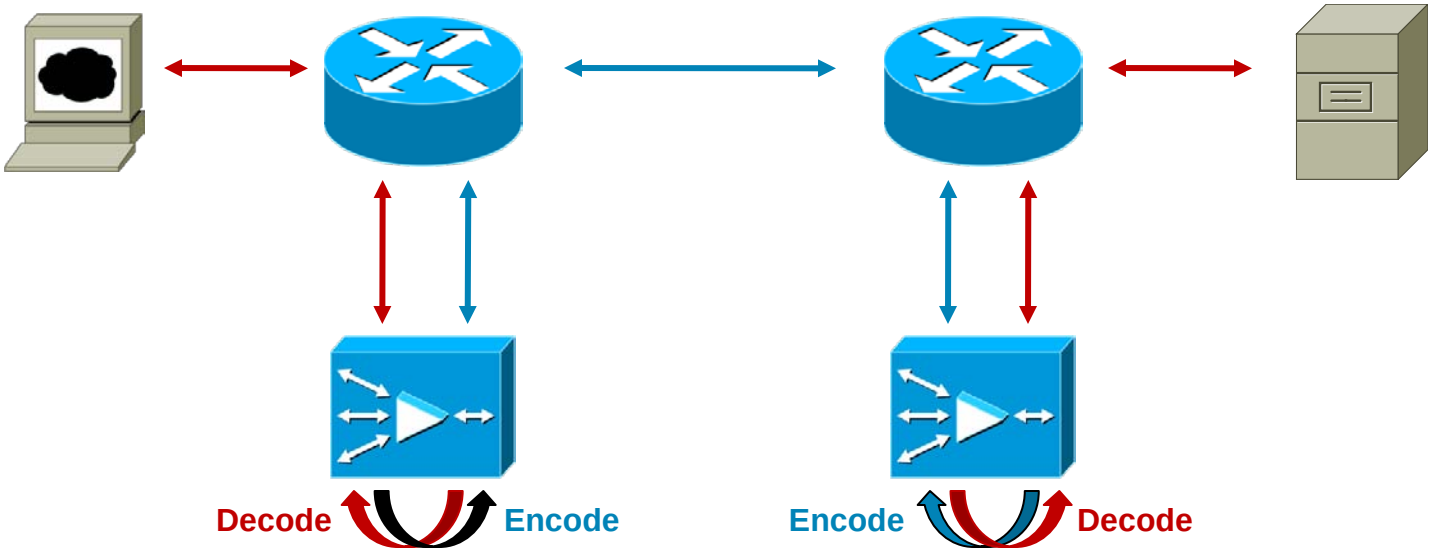
Encode and Decode – LZ and DRE



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Insufficient Cache Overload Condition

```
WAE674# show statistics dre

Cache:
    Status: Usable, Oldest Data (age): 7h
      Total usable disk size: 143487 MB,  Used: 0.05%
      Hash table RAM  size:    573 MB,  Used: 0.00%

Connections:   Total (cumulative): 1883   Active: 6

Encode:
   Overall: msg:     317866, in:  45651 KB, out:  45651 KB, ratio:  89.22%
       DRE: msg:     164965, in:  44237 KB, out:  44237 KB, ratio:  83.32%
DRE Bypass: msg:     306256, in:   1413 KB
        LZ: msg:     164434, in:
 LZ Bypass: msg:     153432, in:
    Avg latency:      0.056 ms
  Encode th-put:   2570 KB/s
  Message size distribution:
    0-1K=97%  1K-5K=2%  5K-15K=0%  15K-25K=0%  25K-40K=0%  >40K=0%
Decode:
   Overall: msg:     471556, in:  63895 KB, out:  63895 KB, ratio:  95.94%
       DRE: msg:     166395, in:  63150 KB, out:  63150 KB, ratio:  95.98%
DRE Bypass: msg:     306171, in:    916 KB
        LZ: msg:      13916, in:   1632 KB, out:   1632 KB, ratio:  58.29%
 LZ Bypass: msg:     457640, in:  62263 KB
    ..
```

Combine cache usage and age with the encode statistics for compression to assess adequacy of cache size

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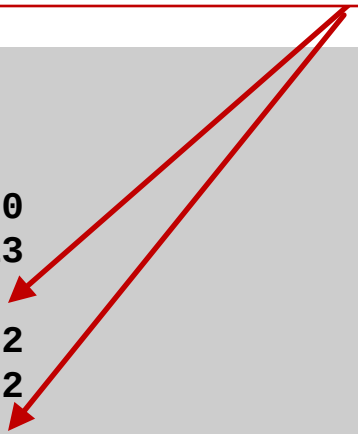
Peer Fan-out Overload Condition

- The number of degraded peers means peers in excess of fan out limits for the device.
- These peers cannot add new data into DRE cache, they can only read from and use existing chunks in cache.
- This shows how many peers are in that state, max historically and current.

```
WAE7326# show statistics peer dre

Current number of connected peers:  20
Current number of active peers:     13
Current number of degrade peers:    0
Maximum number of connected peers:  32
Maximum number of active peers:     32
Maximum number of degraded peers:   0

< snip >
```



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TFO Overload Condition

```
WAE-674# show statistics tfo detail

 Total number of connections                          : 31
  No. of active connections                           : 1
  No. of pending (to be accepted) connections         : 0
  ..

   Policy Engine Statistics
   ------------------------
   Session timeouts: 0,  Total timeouts: 0
   Last keepalive received 00.9 Secs ago
   Last registration occurred 16:53:06.9 Hours:Mins:Secs ago
   Hits:                    3327, Update Released:                2556
   Active Connections:         1, Completed Connections:           772
   Drops:                      0
   Rejected Connection Counts Due To: (Total: 0)
      Not Registered      :          0,  Keepalive Timeout   :          0
      No License          :          0,  Load Level          :          0
      Connection Limit    :          0,  Rate Limit          :          0
      Minimum TFO         :          0,  Resource Manager    :          0
      Global Config       :          0,  Server-Side         :          0
      DM Deny             :          0,  No DM Accept
```

Optimized connections

Active Connections

Connection Limit

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AO Overload Condition

```
WAE-674# show statistics accelerator http detail

   ..
   Total Handled Connections:                                          16
   Total Optimized Connections:                                        16
   Total Connections Handed-off with Compression Policies Unchanged:   0
   Total Dropped Connections:                                          0
   Current Active Connections:                                         0
   Current Pending Connections:                                        0
   Maximum Active Connections:                                         4
   Total Time Saved (ms):                                              123
   ..

   Policy Engine Statistics
   ------------------------
   Session timeouts: 0,  Total timeouts: 0
   Last keepalive received 00.0 Secs ago
   Last registration occurred 17:19:05.2 Hours:Mins:Secs ago
   Hits:                      18, Update Released:                      2
   Active Connections:         0, Completed Connections:               16
   Drops:                      0
   Rejected Connection Counts Due To: (Total: 0)
      Not Registered      :          0,  Keepalive Timeout   :          0
      No License          :          0,  Load Level          :          0
      Connection Limit    :          0,  Rate Limit          :          0
      Minimum TFO         :          0,  Resource Manager    :          0
      Global Config       :          0,  Server-Side
      DM Deny             :          0,  No DM Accept
```

Optimized connections

Active Connections

Connection Limit

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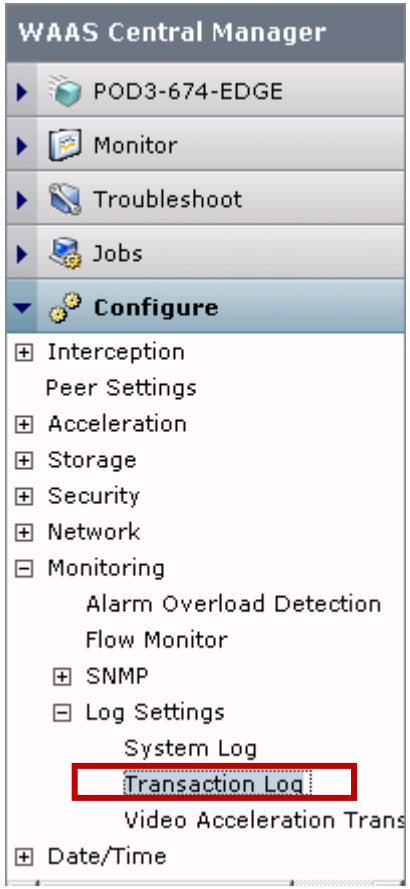
Transaction Logs

- Every transaction generates log
- Multiple transaction attributes recorded
  - TCP connection start time
  - TCP connection end time
  - Optimization done (AO, DRE, LZ, TFO, or PT)
  - Flow identification information (L3/L4/L5)
  - Bytes
    - Origin received/sent
    - Optimized received/sent



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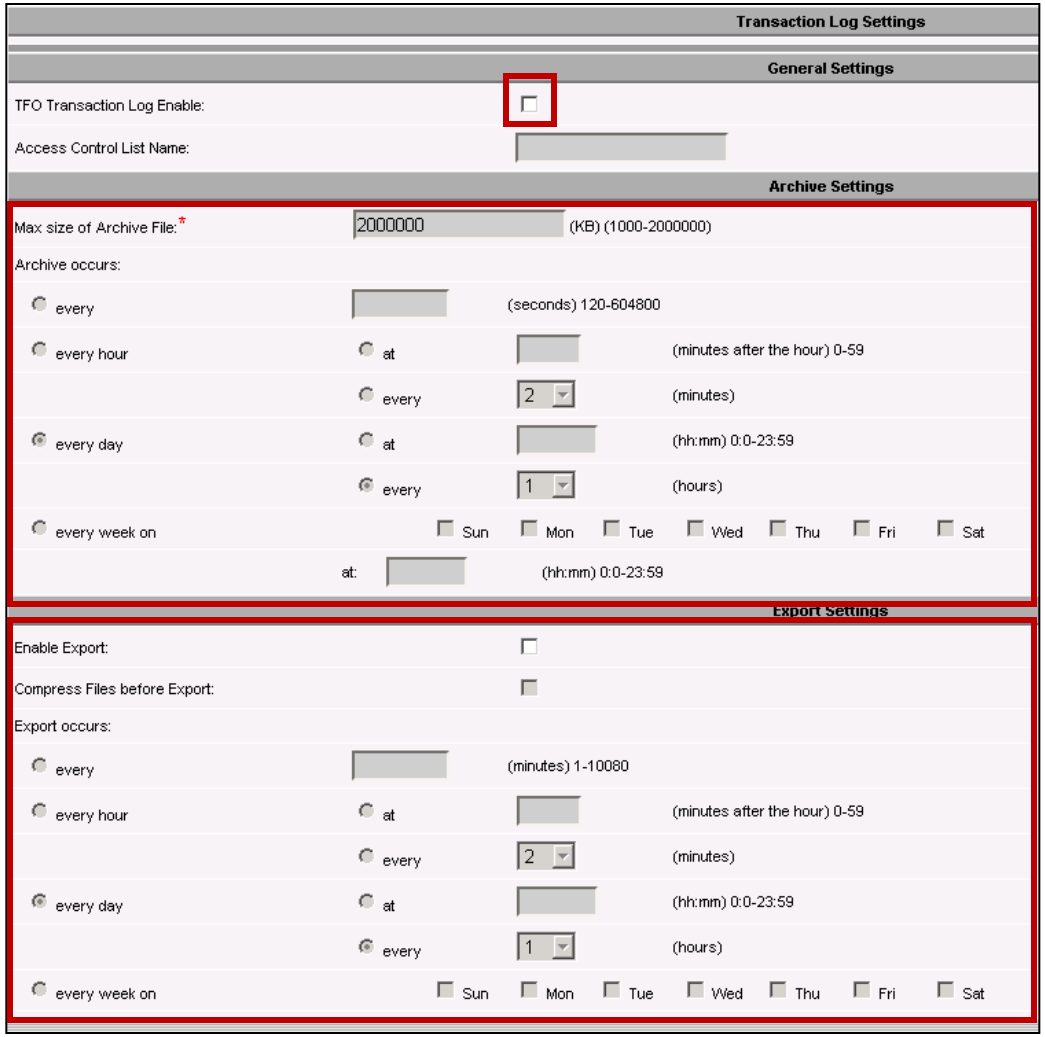
Transaction Logs – CM

- Enable transaction logging on WAEs
- Written to **/local1/logs/tfo/**
- Archive log schedule
- The archive filenames use this format: **tfo_log_IPADDRESS_YYYYMMDD_HHMMSS.txt**
- Export log schedule



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TFO Transaction Logs

```
WAE# cd logs/tfo
WAE#
WAE# ls
ftp_export.status
tfo_log_22.1.43.10_20090508_190000.txt
tfo_log_22.1.43.10_20090508_200000.txt
tfo_log_22.1.43.10_20090508_210000.txt
working.log

WAE#
WAE# type-tail working.log

Fri May  8 21:08:19 2009 :22.1.43.10 :42029 :22.1.43.20 :443 :BP :NO_PEER :
(TFO) (TFO) (None) :<None> :(None) (None) :<None> :<None>
Fri May  8 21:08:34 2009 :22.1.41.10 :13113 :22.1.43.20 :443 :BP :ASYMMETRIC :
(TFO) (None) (TFO) :<None> :(None) (None) :<None> :<None>
..

<date and time>:<src IP>:<src port>:<dst IP>:<port>:BP:<pass-through reason>::
```

Location of logs

The archive files and the current log files

Log entries (fields delimited by ":")

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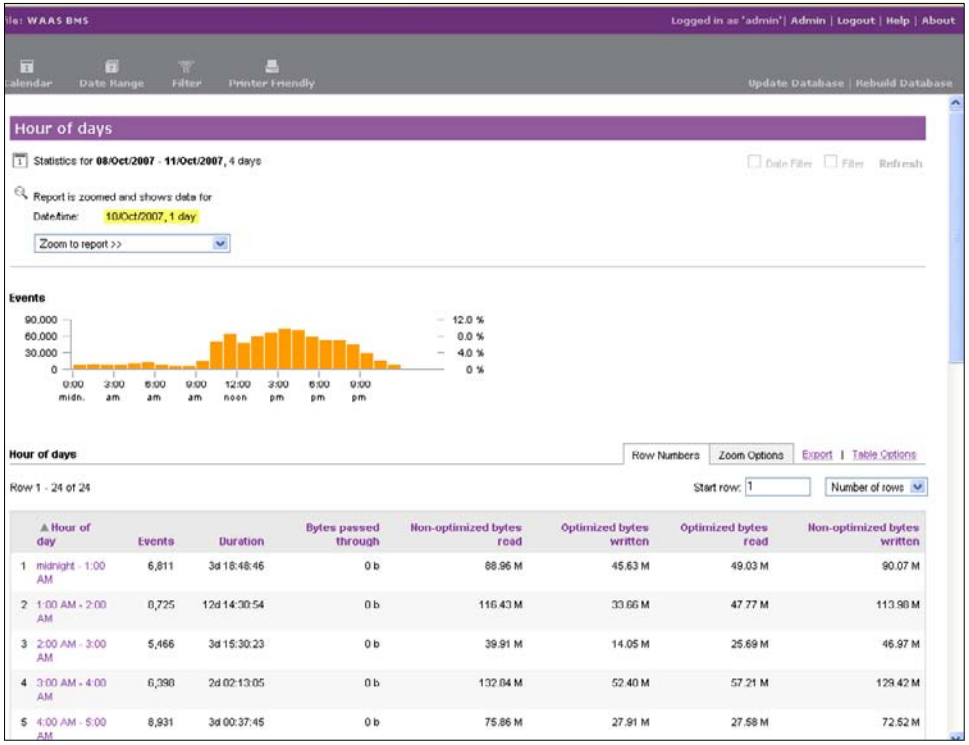
Sawmill Transaction Log Analysis

- Sawmill understands WAAS transaction logs
- Syslog or FTP/SFTP transfer
- Extensive reports


WAAS BMS
Logged in as 'admin' | Admin | Logout | Help | About
Calendar
Date Range
Filter
Printer Friendly
Update Database | Rebuild Database
Hour of days
Statistics for 08/Oct/2007 - 11/Oct/2007, 4 days
Report is zoomed and shows data for
Date&time: 10/Oct/2007, 1 day
Zoom to report >>
Events
90,000
60,000
30,000
0
12.0 %
8.0 %
4.0 %
0 %
midn.
am
noon
pm
Hour of days
Row Numbers
Zoom Options
Export | Table Options
Row 1 - 24 of 24
Start row: 1
Number of rows
Hour of day
Events
Duration
Bytes passed through
Non-optimized bytes read
Optimized bytes written
Optimized bytes read
Non-optimized bytes written
1 midnight - 1:00 AM 6,811 3d 18:48:46 0 b 88.96 M 45.63 M 49.03 M 90.07 M
2 1:00 AM - 2:00 AM 8,725 12d 14:30:54 0 b 116.43 M 33.66 M 47.77 M 113.98 M
3 2:00 AM - 3:00 AM 5,466 3d 15:30:23 0 b 39.91 M 14.05 M 25.69 M 46.97 M
4 3:00 AM - 4:00 AM 6,398 2d 02:13:05 0 b 132.84 M 52.40 M 57.21 M 129.42 M
5 4:00 AM - 5:00 AM 8,931 3d 00:37:45 0 b 75.86 M 27.91 M 27.58 M 72.52 M

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Application Acceleration

WAE Overview
Diagnostic Reports
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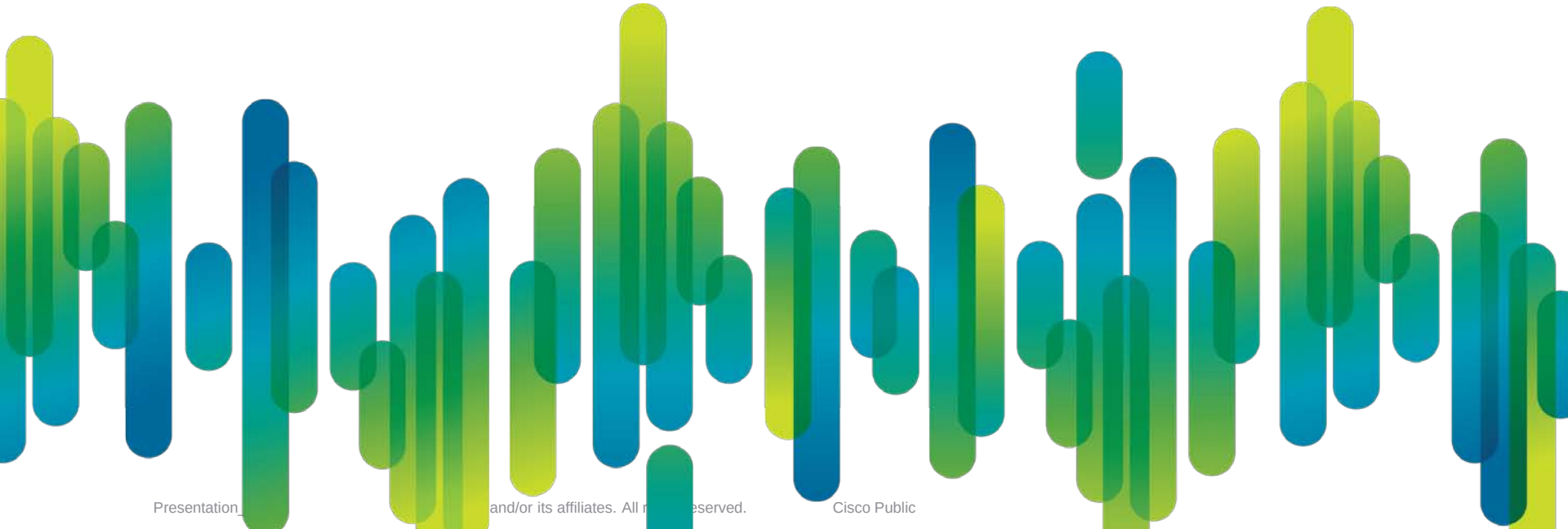
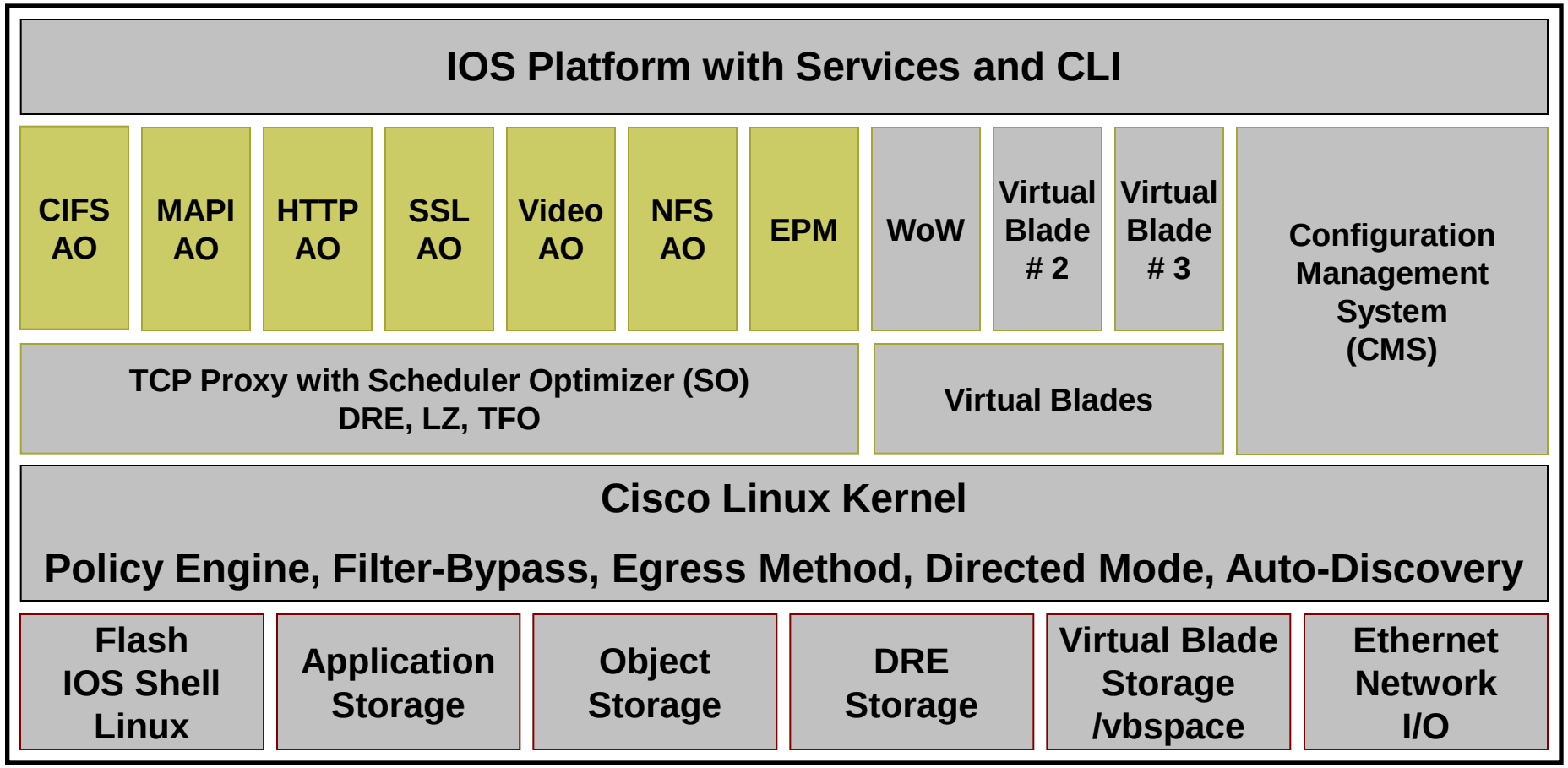
Transport Optimizations
> Application Acceleration
Packet Capture Debugs
Summary



Wide Area Application Engine (WAE)



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Accelerator Status

- Displays the configuration and operational state of each accelerator

```
POD3-674-EDGE# show accelerator

Accelerator     Licensed        Config State    Operational State
-----------     --------        ------------    -----------------
cifs            Yes             Enabled         Running
epm             Yes             Enabled         Running
http            Yes             Enabled         Running
mapi            Yes             Enabled         Running
nfs             Yes             Disabled        Shutdown
ssl             Yes             Disabled        Shutdown
video           Yes             Enabled         Running
wafs-core       Yes             Disabled        Shutdown
wafs-edge       Yes             Disabled        Shutdown
```

```
POD3-674-EDGE# show license
License Name   Status      Activation Date Activated By
-------------- ----------- --------------- -------------
Transport      not active
Enterprise     active      04/07/2010      admin
Video          active      05/13/2010      admin
Virtual-Blade  active      04/07/2010      admin
```

Accelerator Status

```
POD3-674-EDGE# show accelerator cifs
Accelerator     Licensed        Config State    Operational State
-----------     --------        ------------    -----------------
cifs            Yes             Enabled         Running

CIFS:
   Policy Engine Config Item            Value
   -------------------------            -----
   State                                Registered
   Default Action                       Use Policy
   Connection Limit                     2000
   Effective Limit                      1985
   Keepalive timeout                    5.0 seconds

POD3-674-EDGE# show accelerator mapi
Accelerator     Licensed        Config State    Operational State
-----------     --------        ------------    -----------------
mapi            Yes             Enabled         Running

MAPI:
   Accelerator Config Item              Mode          Value
   -----------------------              ----          ------
   Read optimization                    User          enabled
   Write optimization                   User          enabled
   Reserved pool size max percent       User          15%

   Policy Engine Config Item            Value
   -------------------------            -----
   State                                Registered
   Default Action                       Use Policy
   Connection Limit                     2000
   Effective Limit                      1985
   Keepalive timeout                    5.0 seconds
```


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Global AO Statistics

show statistics accelerator <ao>

- Common statistics for all accelerators

```
WAE# show statistics accelerator http

HTTP:
   Global Statistics
   -----------------
   Time Accelerator was started:                              Mon Jun 22 02:25:53 2009
   Time Statistics were Last Reset/Cleared:                   Mon Jun 22 02:25:53 2009
   Total Handled Connections:                                                      52
   Total Optimized Connections:                                                    52
   Total Connections Handed-off with Compression Policies Unchanged:               0
   Total Dropped Connections:                                                      0
   Current Active Connections:                                                     0
   Current Pending Connections:                                                    0
   Maximum Active Connections:                                                     30
   Total Time Saved (ms):                                                          312
   Current Active Connections Free For Fast Connection Use:                        0
   Total Connections Handed-off:                                                   0
   Total Connections Handed-off with Compression Policies Disabled:                0
   Total Connections Handed-off to SSL:                                            0
   Total Connection Hand-off Failures:                                             0
   Total Fast Connection Successes:                                                5
<snip>
```


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CIFS Acceleration

- Verify CIFS is properly configured

```
POD3-674-EDGE# show run | include CIFS
      name WAFS classifier CIFS action optimize full accelerate cifs
POD3-674-EDGE#show run | begin CIFS

...skipping
   classifier CIFS
      match dst port eq 139
      match dst port eq 445
   exit
```

- Verify established connections

```
POD3-674-EDGE# show statistics connection optimized cifs

<snip>
D:DRE,L:LZ,T:TCP Optimization RR:Total Reduction Ratio
A:AOIM,C:CIFS,E:EPM,G:GENERIC,H:HTTP,M:MAPI,N:NFS,S:SSL,V:VIDEO

ConnID       Source IP:Port          Dest IP:Port            PeerID Accel RR
    15     22.1.32.100:3142      22.1.34.100:445 00:1a:64:c2:2b:9c TCDL  81.2%
```


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EPM / MAPI Acceleration

```
WAE674# show policy-engine application dynamic
Dynamic Match Freelist Information:
  Allocated: 32768  In Use: 1  Max In Use: 10  Allocations: 4957

Dynamic Match Type/Count Information:
  None                      0
  Clean-Up                  0
  Host->Host                0
  Host->Local               0
  Local->Host               0
  Local->Any                0
  Any->Host                 1
  Any->Local                0
  Any->Any                  0

Individual Dynamic Match Information:

  Number:     1   Type: Any->Host (6)  User Id: EPM (3)
    Src: ANY:ANY  Dst: 10.56.44.245:1248

    Map Name: uuida4f1db00-ca47-1067-b31f-00dd010662da
    Flags: TIME_LMT REPLACE FLOW_CNT
    Seconds: 1200  Remaining: - NA -  DM Index: 32766

    Hits: 1  Flows: 2  Cookie: 0x00000000
```

1 entry per server

MAPI UUID

Hit and Conn count

MAPI Acceleration

```
WAE674# show statistics accelerator mapi
   ..
   Current Active Connections:
   Current Pending Connections:
   ..
   Total Secured Connections:                                    0
   ..
   Current 2003 Accelerated Sessions:                            9
   Current 2007 Accelerated Sessions:                            8
   Current 2010 Accelerated Sessions:                            0
   Lower than 2000 Sessions:                                     0
   ..
   ..
   Reserved Connections Pool Statistics
   ------------------------------------
   Current In-Use Connections:                                   17
   Current Reserved (Unused) Connections:                        46
   Average In-Use Connections in Last One Hour                   14.30
   Average Reserved (Unused) Connections in Last One Hour        45.73
   Average In-Use Connections in Last 5min                       13.26
   Average Reserved (Unused) Connections in Last 5min            45.26
   Configured Maximum Reserved (Unused) Connections:             900
   Rejected Interesting Connections Due To No Reservation:       0
   Rejected Interesting Connections Due To Unavailable Peer:     0
```

Session Versions

Potential Escaped Connections

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HTTP Acceleration

- Check connections statistics

```
WAE674# show statistics connection optimized http detail

< snip >

HTTP : 30

   Time Statistics were Last Reset/Cleared:              Thu May 13 03:54:48 2010
   Total Bytes Read:                                        794        8660
   Total Bytes Written:                                     794        8660
   Total Bytes Buffered:                                    0          0
   Total Internal Bytes Read:                               8
   Total Internal Bytes Written:                            8
   Bit Flags for I/O state:                                 1040
   Internal object pointer:                                 138630904
   Fast connections:                                        0
```

Positive value = latency mitigation

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HTTP Acceleration

- Check accelerator statistics

```
WAE674# show statistics accelerator http
<snip>
   Maximum Active Connections:                                    4
   Total Time Saved (ms):                                         123
   Current Active Connections Free For Fast Connection Use:       0
   Total Connections Handed-off:                                  0
   Total Connections Handed-off with Compression Policies Disabled:  0
   Total Connections Handed-off to SSL:
   Total Connection Hand-off Failures:
   Total Fast Connection Successes:                               2
   ..
   Total Time Saved by Fast Connection Use (ms):                  123
   ..
   Total Server Compression Suppression:                          20
   ..
   Total Hints Sent to DRE Layer to Flush Data:                   34
   Total Hints Sent to DRE Layer to Skip LZ:                      0
   Total Hints Sent to DRE Layer to Skip Header Information:      20
POD3-674-EDGE#
```

Suppress Server Encoding

Total Number of DRE hints for the 3 types

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SSL Acceleration

```
WAE-674# show crypto certificates

Certificate Only Store:
-----------------------
<EMPTY>

Managed Store:
--------------
File: any-ssl.p12                 Format: PKCS12
EEC: Subject: emailAddress=bubba@davis.com/C=US/ST=California/L=San Jose/OU=W
AAS/O=Cisco Systems/CN=*.domain.com
     Issuer: emailAddress=bubba@davis.com/C=US/ST=California/L=San Jose/OU=WA
AS/O=Cisco Systems/CN=*.domain.com
-------------------------------------------------------------------------------
Local Store:
------------
Machine Self signed Certificate
-------------------------------
Format: PKCS12
Subject: C=US/ST=California/L=San Jose/OU=CNBU/O=Cisco Systems, Inc/CN=dc1-wae1.
allcisco.com/emailAddress=tac@cisco.com
Issuer: C=US/ST=California/L=San Jose/OU=CNBU/O=Cisco Systems, Inc/CN=dc1-wae1.a
llcisco.com/emailAddress=tac@cisco.com

Management Service Certificate
------------------------------
Format: PKCS12
EEC:Subject: C=US/ST=California/L=San Jose/OU=CNBU/O=Cisco Systems, Inc/CN=dc1-w
ae1.allcisco.com/emailAddress=tac@cisco.com
    Issuer: C=US/ST=California/L=San Jose/OU=CNBU/O=Cisco Systems, Inc/CN=dc1-wa
e1.allcisco.com/emailAddress=tac@cisco.com
The WAAS Self Signed Certificate is being used as the Management Service Certificate
```

Accelerated service

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SSL Acceleration

```
WAE-674# show crypto certificates

Certificate Only Store:
-----------------------
<EMPTY>

Managed Store:
--------------
File: any-ssl.p12                Format: PKCS12
EEC: Subject: emailAddress=bubba@davis.com/C=US/ST=California/L=
AAS/O=Cisco Systems/CN=*.domain.com
     Issuer: emailAddress=bubba@davis.com/C=US/ST=California/L=San Jose/OU=WA
AS/O=Cisco Systems/CN=*.domain.com
-------------------------------------------------------------------------------
Local Store:
------------
Machine Self signed Certificate
-------------------------------
Format: PKCS12
Subject: C=US/ST=California/L=San Jose/OU=CNBU/O=Cisco Systems, Inc/CN=dc1-wae1.
allcisco.com/emailAddress=tac@cisco.com
Issuer: C=US/ST=California/L=San Jose/OU=CNBU/O=Cisco Systems, Inc/CN=dc1-wae1.a
llcisco.com/emailAddress=tac@cisco.com

Management Service Certificate
------------------------------
Format: PKCS12
EEC:Subject: C=US/ST=California/L=San Jose/OU=CNBU/O=Cisco Systems, Inc/CN=dc1-w
ae1.allcisco.com/emailAddress=tac@cisco.com
    Issuer: C=US/ST=California/L=San Jose/OU=CNBU/O=Cisco Systems, Inc/CN=dc1-wa
e1.allcisco.com/emailAddress=tac@cisco.com
The WAAS Self Signed Certificate is being used as the Management Service Certificate
```

Peering service

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SSL Acceleration

```
WAE-674# show crypto certificates

Certificate Only Store:
-----------------------
<EMPTY>

Managed Store:
--------------
File: any-ssl.p12                Format: PKCS12
EEC: Subject: emailAddress=bubba@davis.com/C=US/ST=California/L=San Jose/OU=W
AAS/O=Cisco Systems/CN=*.domain.com
     Issuer: emailAddress=bubba@davis.com/C=US/ST=California/L=San Jose/OU=WA
AS/O=Cisco Systems/CN=*.domain.com
------------------------------------------------------------------------------
Local Store:
------------
Machine Self signed Certificate
-------------------------------
Format: PKCS12
Subject: C=US/ST=California/L=San Jose/OU=CNBU/O=Cisco Systems, Inc/CN=dc1-wae1.
allcisco.com/emailAddress=tac@cisco.com
Issuer: C=US/ST=California/L=San Jose/OU=CNBU/O=Cisco Systems, Inc/CN=dc1-wae1.a
llcisco.com/emailAddress=tac@cisco.com

Management Service Certificate
------------------------------
Format: PKCS12
EEC:Subject: C=US/ST=California/L=San Jose/OU=CNBU/O=Cisco Systems, Inc/CN=dc1-w
ae1.allcisco.com/emailAddress=tac@cisco.com
    Issuer: C=US/ST=California/L=San Jose/OU=CNBU/O=Cisco Systems, Inc/CN=dc1-wa
e1.allcisco.com/emailAddress=tac@cisco.com
The WAAS Self Signed Certificate is being used as the Management Service Certificate
```

Management service

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SSL Accelerator

- Unlike other AOs, SSL does not use an ‘accelerate’ policy map entry
- Dynamic policy entries are created when SSL acceleration services are brought ‘inservice’

```
WAE674# show run | begin crypto

...skipping
crypto ssl services global-settings
   version all
   exit
!
crypto ssl services accelerated-service wx1.getthere.net
   description Cisco Travel Network
   version all
   server-cert-key wx1.p12
   server-ip 151.193.164.6 port 443
   inservice
   exit
crypto ssl services accelerated-service wwwin-tools.cisco.com
   version all
   server-cert-key wwwin-tools.p12
   server-ip 171.70.150.5 port 443
   inservice
   exit
!
< snip >
WAE674#
```

Only configured on server-side (i.e. Core) WAEs

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SSL Accelerator

```
WAE-674# show policy-engine application dynamic

<skip>

Individual Dynamic Match Information:
  Number:     1   Type: Any->Host (6)  User Id: SSL (4)
    Src: ANY:ANY  Dst: 2.53.4.3:443
    Map Name: basic
    Flags: SSL
    Seconds: 0  Remaining: - NA -  DM Index: 32765
    Hits: 0  Flows: - NA -  Cookie: 0x40000001
    DM Ref Index: - NA -  DM Ref Cnt: 0

  Number:     2   Type: Any->Any (8)  User Id: SSL (4)
    Src: ANY:ANY  Dst: ANY:443
    Map Name: basic
    Flags: REPLACE SSL
    Seconds: 0  Remaining: - NA -  DM Index: 32767
    Hits: 2156  Flows: - NA -  Cookie: 0x2FFFFFFF
    DM Ref Index: - NA -  DM Ref Cnt: 0
```

Dynamically created policy for SSL traffic

Cookie Types:
server–ip: 0x8xxxxxxx
server-name : 0x4xxxxxxx
server-domain : 0x2fffffff (special cookie which indicates rDNS lookup is required)
server-ip any : 0x1xxxxxxx

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SSL Acceleration

- Check accelerator statistics

```
WAE674# show statistics accelerator ssl
< snip >

   Number of SSLv3 negotiated on LAN:                                39
   Number of TLSv1 negotiated on LAN:                                1237
   Number of SSLv3 negotiated on WAN:                                39
   Number of TLSv1 negotiated on WAN:                                1237
   Number of SSLv3 negotiated on peer:                               0
   Number of TLSv1 negotiated on peer:                               1276
   Total renegotiations requested by server:                         0
   Total SSL renegotiations attempted:                               0
   Total number of failed renegotiations:                            0
   Flows dropped due to renegotiation timeout:                       0

POD3-674-EDGE# show statistic accelerator ssl | include Failed
   Total Failed Handshakes:                                          0
   Total Failed Certificate Verifications:                           0
   Failed certificate verifications due to invalid certificates:     0
   Failed Certificate Verifications based on OCSP Check:             0
   Failed Certificate Verifications (non OCSP):                      0
   Total Failed Certificate Verifications due to Other Errors:       0
   Total Failed OCSP Requests:                                       0
   Total Failed OCSP Requests due to Other Errors:                   0
   Total Failed OCSP Requests due to Connection Errors:              0
   Total Failed OCSP Requests due to Connection Timeouts:            0
   Total Failed OCSP Requests due to Insufficient Resources:         0
```


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SSL Acceleration

```
WAE674-EDGE# show statistics connection

<snip>

D:DRE,L:LZ,T:TCP Optimization,
A:AOIM,C:CIFS,E:EPM,G:GENERIC,H:HTTP,M:MAPI,N:NFS,S:SSL,V:VIDEO

ConnID  Source IP:Port        Dest IP:Port          PeerID             Accel  RR
198     22.1.32.100:1939      22.1.34.100:80        00:1a:64:c2:2b:9c  THDL   67.8%
199     22.1.32.100:1940      22.1.34.100:80        00:1a:64:c2:2b:9c  THDL   83.1%
201     22.1.32.100:2046      22.1.34.100:443       00:1a:64:c2:2b:9c  TSDL   79.3%

WAE674-CORE# show statistics connection

<snip>

D:DRE,L:LZ,T:TCP Optimization,
A:AOIM,C:CIFS,E:EPM,G:GENERIC,H:HTTP,M:MAPI,N:NFS,S:SSL,V:VIDEO

ConnID  Source IP:Port        Dest IP:Port          PeerID             Accel  RR

34      22.1.32.100:1939      22.1.34.100:80        00:1a:64:c3:08:2c  THDL   67.8%
36      22.1.32.100:1940      22.1.34.100:80        00:1a:64:c3:08:2c  THDL   83.1%
39      22.1.32.100:2046      22.1.34.100:443       00:1a:64:c3:08:2c  TSDL   79.3%
```


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Video Acceleration

```
WAE-674# show statistics accelerator video

Time elapsed since "clear statistics": 1days 0hr 50min 30sec

Video Connections
=================================

Connections handled                                num       %
-------------------------------------------------------------------
Total handled                                      3330      100.00
Windows-media live accelerated                     3329      99.97
Un-accelerated pipethru                            1         0.03
Un-accelerated dropped due to config               0         0.00
Error dropped connections                          0         0.00

Windows-media active sessions                      current   peak
-------------------------------------------------------------------
Outgoing (client) sessions                         10        10
Incoming (server) sessions                         1         10

Windows-media byte savings
=================================================================
% Bytes saved       Incoming(server) bytes   Outgoing(client) bytes
56.01               2.07 GB                  4.71 GB
```

Summary connection statistics

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Video Acceleration

```
WAE-674# show statistics accelerator video

Time elapsed since "clear statistics": 1days 0hr 50min 30sec

Video Connections
=================================================================

Connections handled                              num       %
-----------------------------------------------------------------
Total handled
Windows-media live accelerated
Un-accelerated pipethru
Un-accelerated dropped due to config             0         0.00
Error dropped connections                        0         0.00

Windows-media active sessions                    current   peak
-----------------------------------------------------------------
Outgoing (client) sessions                       10        10
Incoming (server) sessions                       1         10

Windows-media byte savings
=================================================================
% Bytes saved       Incoming(server) bytes   Outgoing(client) bytes
56.01               2.07 GB                  4.71 GB
```

Current and maximum stream splitting activity

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Video Acceleration

- Detailed accelerator statistics provider unaccelerated and error details

```
WAE-674# show statistics accelerator video detail

< snip >

Unaccelerated Connections                          num       %
-------------------------------------------------------------------
Total Unaccelerated                                1         100.00
Unsupported player                                 0         0.00
Unsupported transport                              0         0.00
Unsupported protocol                               0         0.00
Windows-media VoD                                  1         100.00
Max stream bitrate overload                        0         0.00
Max aggregate bitrate overload                     0         0.00
Max concurrent sessions overload                   0         0.00
Other                                              0         0.00

Error dropped connections
-----------------------------------
Total errors
Client timeouts
Server timeouts
Client stream errors                               0         0.00
Server stream errors                               0         0.00
Other errors                                       0         0.00
```

RTSP header in response missing x-wms-stream-type="broadcast" cache control header

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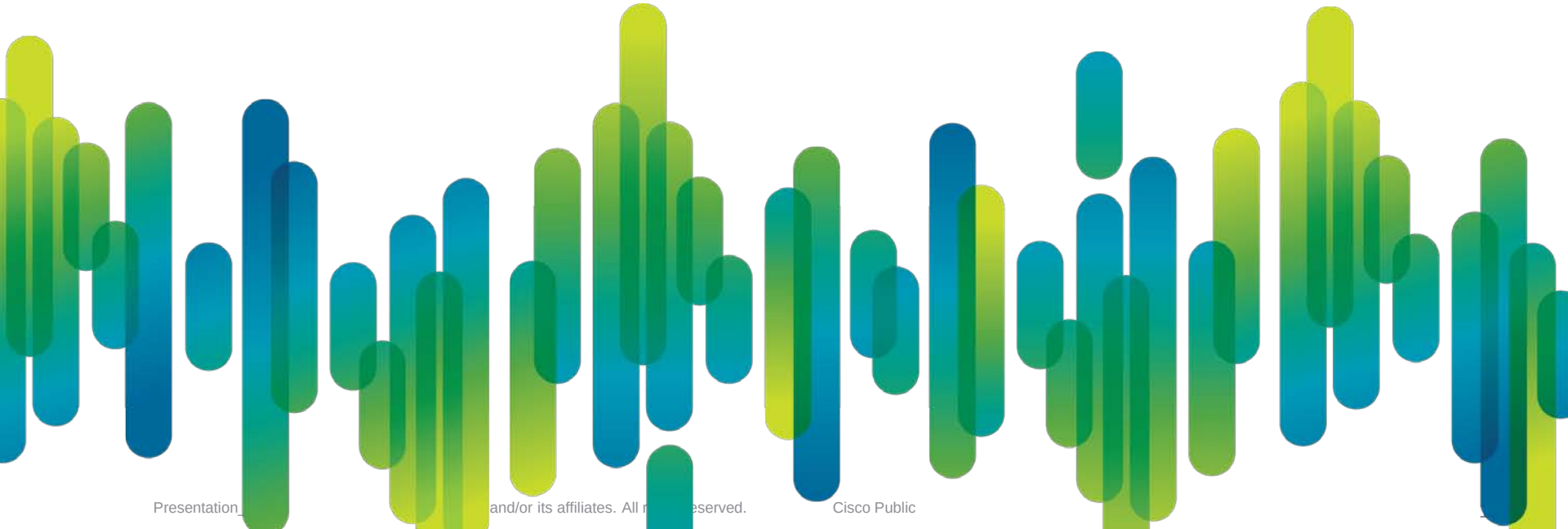
Packet Capture Debugs

WAE Overview
Diagnostic Reports
Physical Components
Platform
Transport Optimizations
Application Acceleration
> Packet Capture Debugs
Summary



Packet Capture Debugs

- Packets can be captured on all WAAS interfaces using one of the following CLI tools:

  tethereal

  tcpdump

- The Problem?

  A packet capture taken on the WAE will contain packets of all TCP segments

- How can you differentiate between original and optimized connections?

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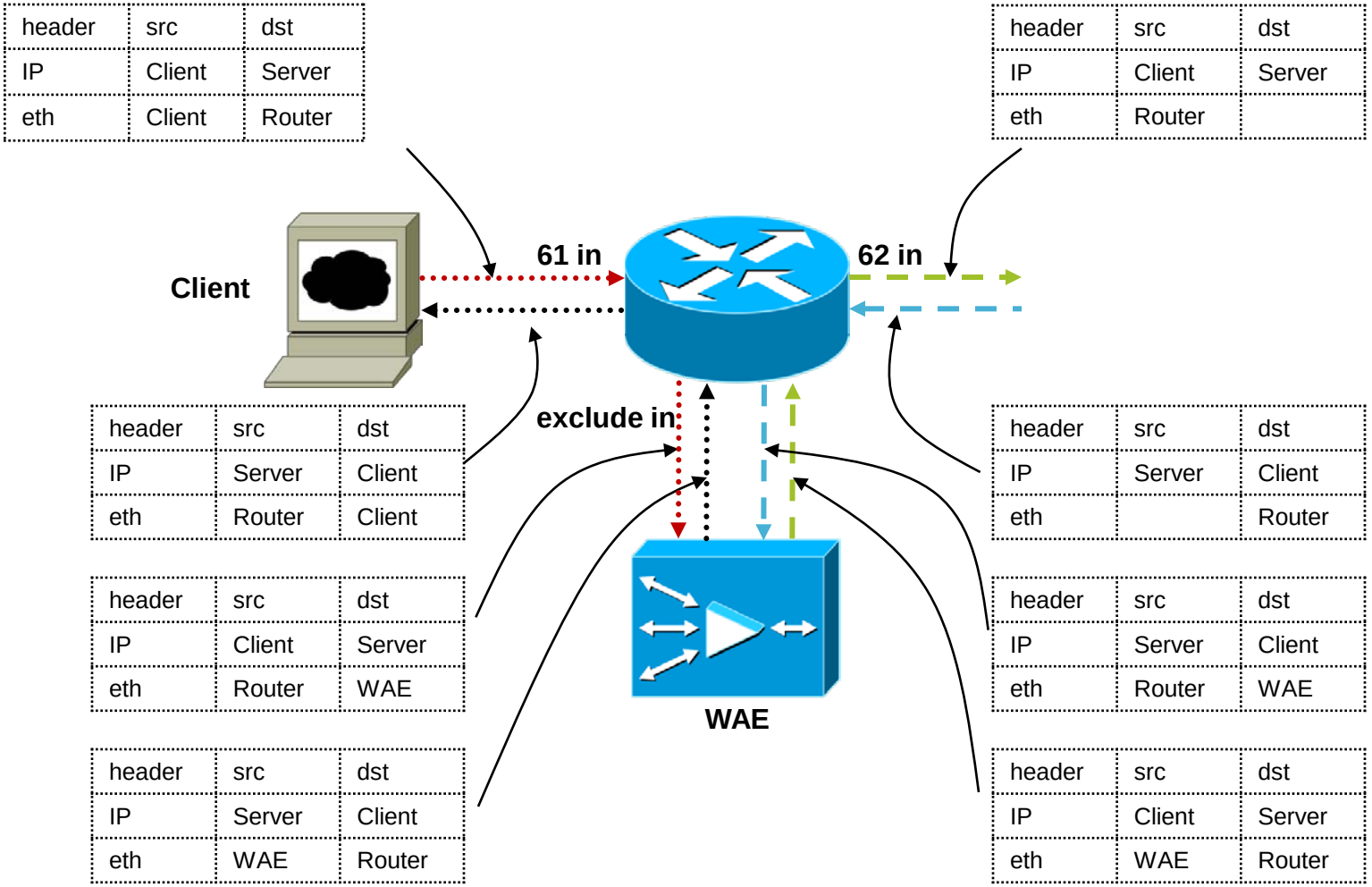
Multiple TCP Segments



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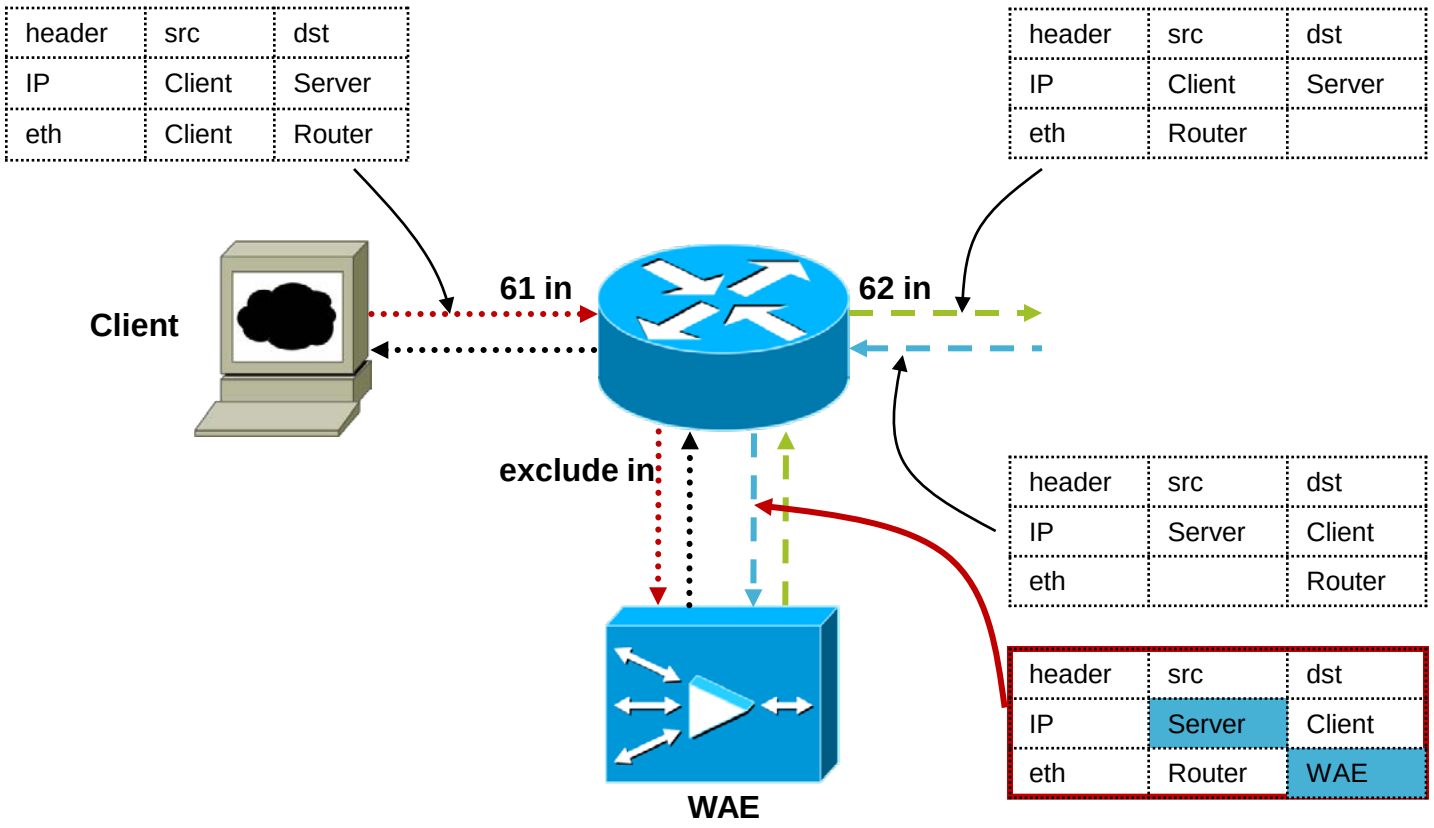
Displaying Optimized Segments



Wireshark Display Filter:

tcp && ip.src == <ServerIP> && eth.dst == <WAE MAC addr>

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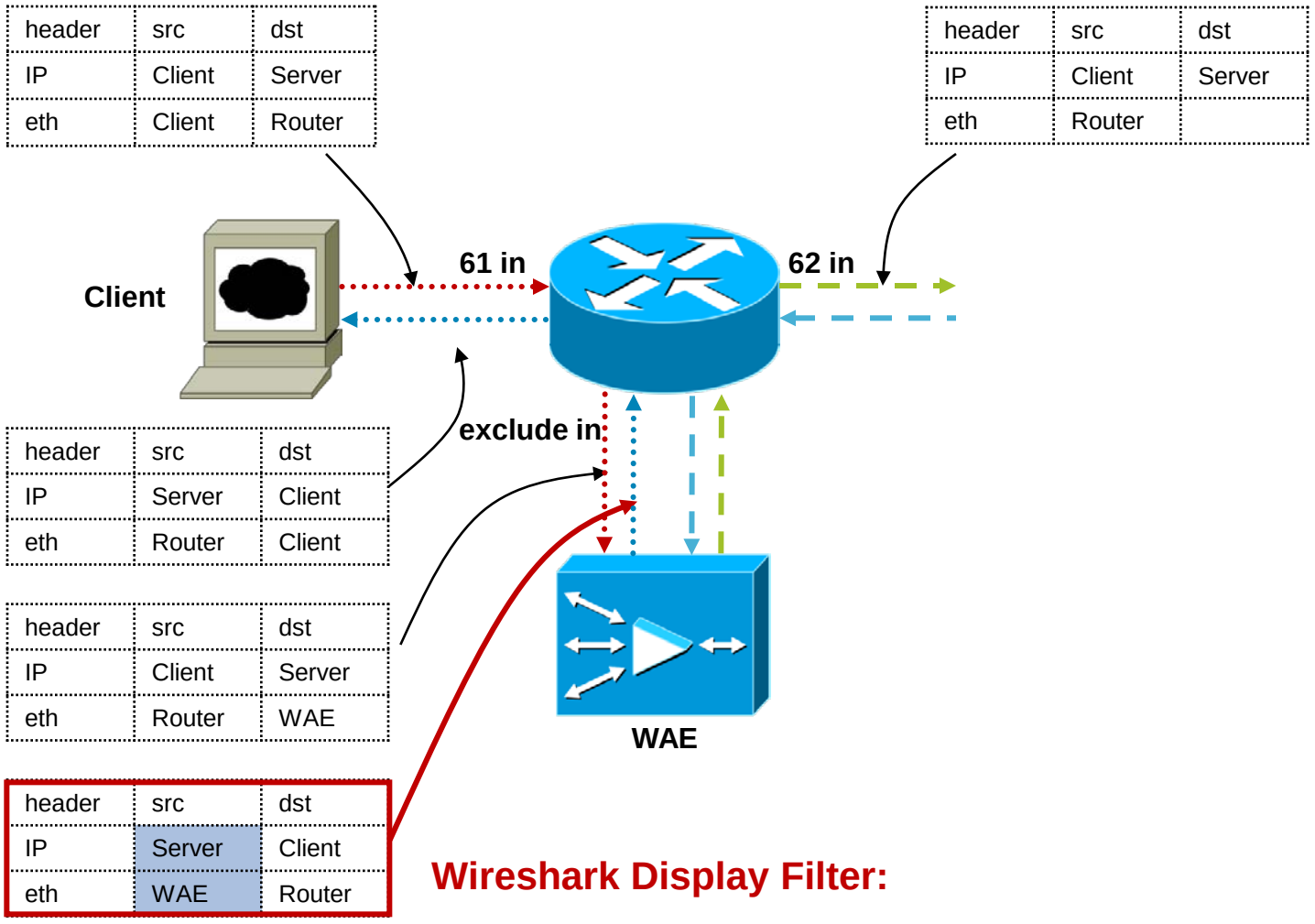
Displaying Original Segments



Wireshark Display Filter:

tcp && ip.src == <ServerIP> && eth.src == <WAE MAC addr>

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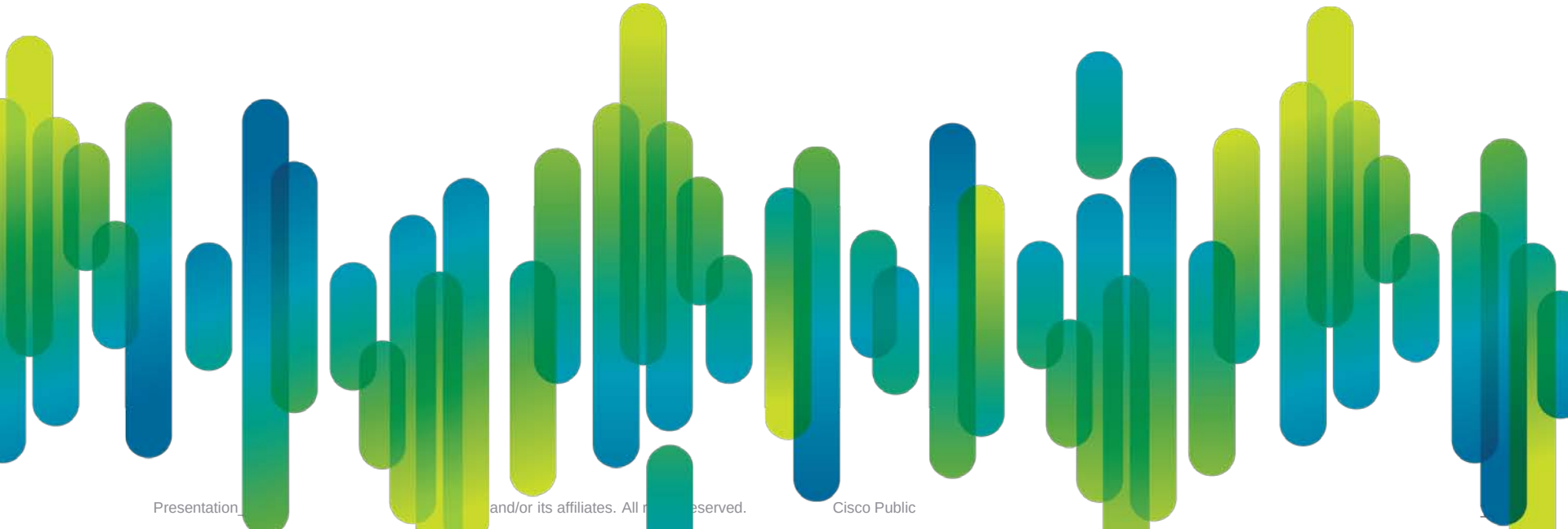
Summary

WAE Overview
Diagnostic Reports
Physical Components
Platform
Transport Optimizations
Application Acceleration
Packet Capture Debugs
> Summary



Summary

- WAAS self diagnostic tool
- Validate configuration on interception device and WAE
- WCCPv2 statistics on the WAE and router
- Automatic discovery counters to verify traffic flow
- Connection statistics provides granular details
- TFO transaction logs provide a history
- AO specific statistics
- Packet traces

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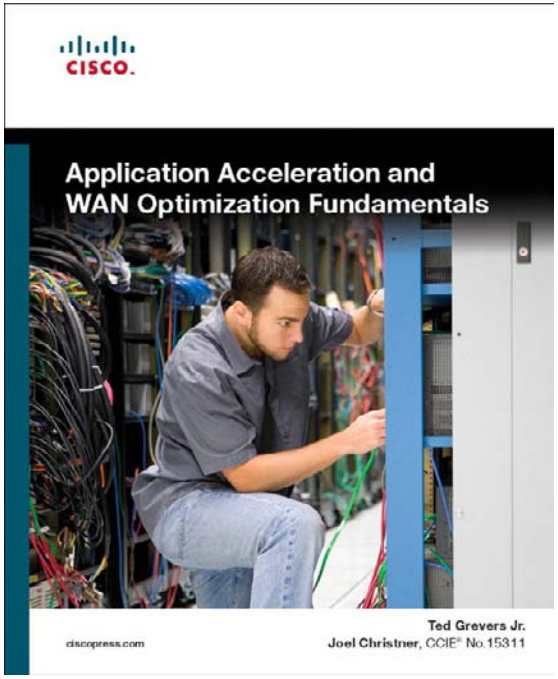
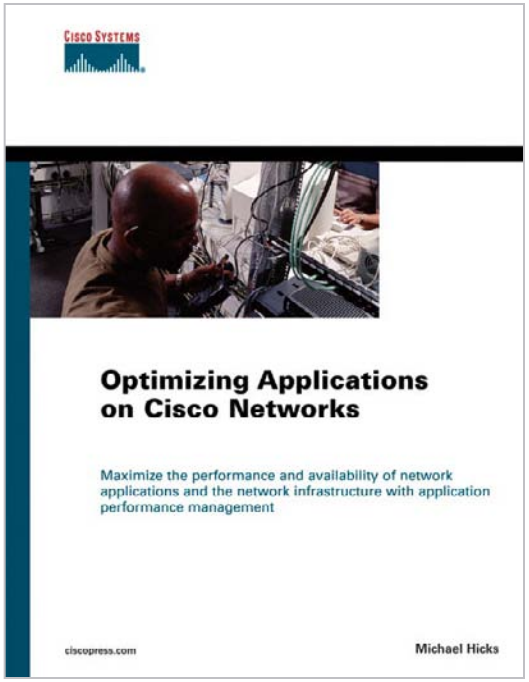
BRKAPP-3006
Recommended Reading




Optimizing Applications
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Maximize the performance and availability of network applications and the network infrastructure with application performance management
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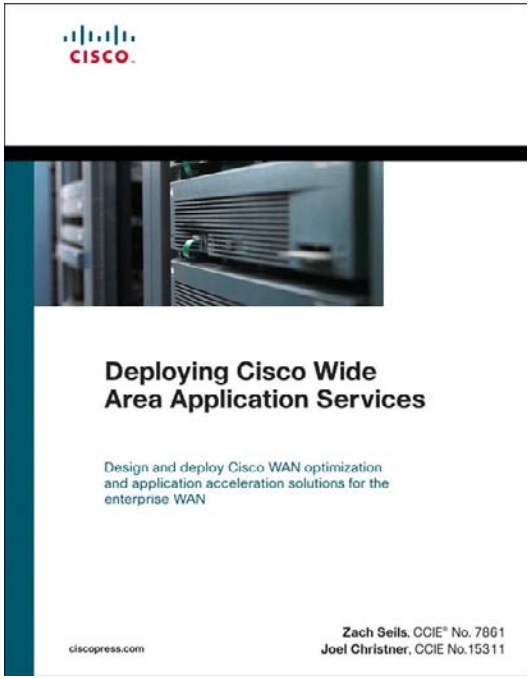
Michael Hicks


Deploying Cisco Wide
Area Application Services
Design and deploy Cisco WAN optimization and application acceleration solutions for the enterprise WAN
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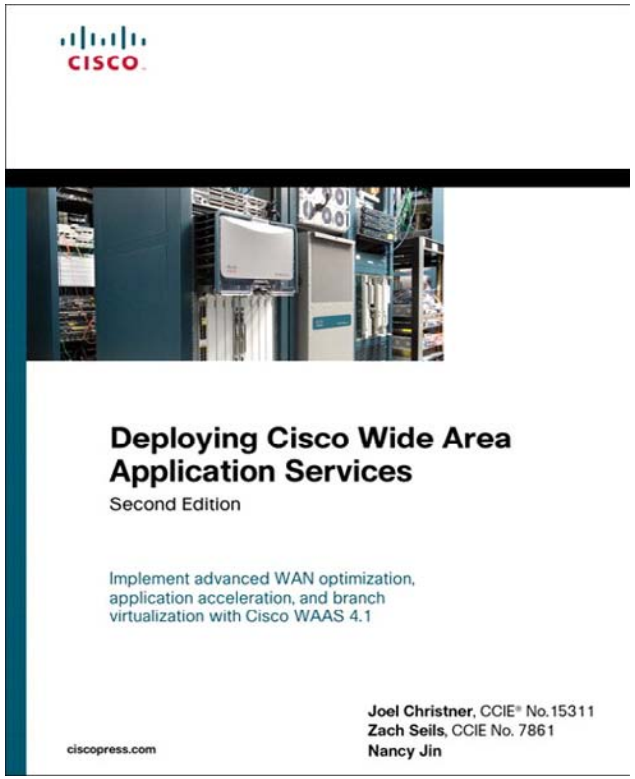
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Second Edition
Implement advanced WAN optimization, application acceleration, and branch virtualization with Cisco WAAS 4.1
Joel Christner, CCIE® No. 15311
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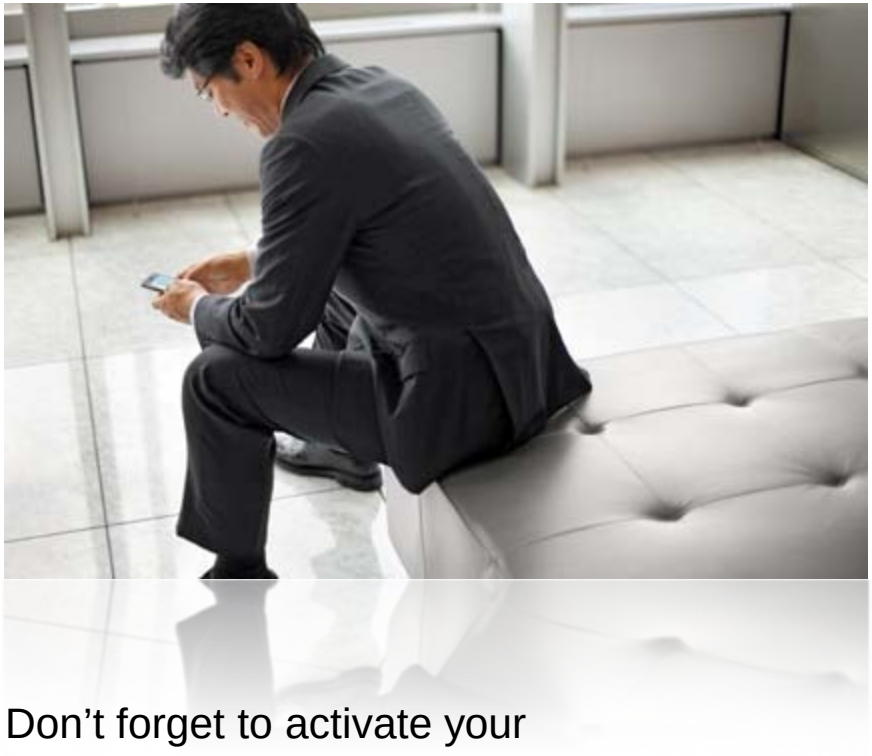

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